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THE STUDY OF THE ANEMIC CHILD

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THERE are two ways of approaching the subject of anemia: (1) We may look on the various forms of the anemia as the result of definite anatomic changes which constitute the disease of which the blood picture is the superficial aspect; or (2) we may look on the anemia as due to disturbances in physiologic processes which have been brought about by various etiologic factors. The effective etiologic factors may be constitutional or intrinsic, or some factor such as infection or other disease involving directly or indirectly the formation or destruction of blood, and such extrinsic factors as intoxication or deficiency. On the one hand, the emphasis is placed on the pathologic entity and the objective is too often the giving of a name, a well-defined place in a well-defined system of classification; on the other hand, the emphasis is on the process and the objective is an understanding of what is going on. I do not wish to minimize the importance of a proper system of classification or to give the impression that classification is opposed to understanding. A good system of classification must be based on an understanding of process. In actual practice, however, the proper naming of a condition does not necessarily imply understanding, and it too often happens that emphasis is confined to those aspects that lead only to the giving of a name. A few examples may make clear what I mean.

In reports dealing with Hodgkin's disease, for instance, it is rare that more than one blood study is recorded, and in some cases it is merely stated that the blood does not contribute to the diagnosis. In general accounts of the disease, the blood is discussed as a side issue only in relation to the light its study may throw on the diagnosis of Hodgkin's disease or on prognosis. Here is a disease primarily of

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blood forming organs, and yet few appear to be interested in what is going on in the blood. The size of the glands may be measured every day, x-ray films made of the chest, the spleen palpated, but a patient may die with widespread marrow involvement without one recorded x-ray film of bones, and often with only one recorded blood study and that one months before death. Conversely, there have been cases with most aberrant blood pictures and every tissue in the body has received a minute description except the bone marrow. That is, the physician is more interested in the classification than he is in learning all he can of the nature of the disease. It is of course true that a study of process will not help the individual patient except possibly in rare instances, but it is also true that without a study of what is going on, we are not likely to learn what the disease actually is.

An example of a different nature is the current discussion over whether erythroblastosis of the newborn is essentially hemolytic or essentially due to disease of the hemopoietic organs. The emphasis is on the disease as a pathologic entity. With a change in point of view, the picture becomes the result of a combination of the two processes of increased hemolysis and disturbance in erythropoiesis. The emphasis is now placed on pathologic alterations of normal processes, and the study of etiology is not directed to finding the cause of a disease, but to understanding the factors leading to these pathologic alterations. What we see is a result which will vary according to the extent of the alteration and the relative predominance of one or another pathologic change.

In discussing the "so-called" von Jaksch anemia, how much space has been expended on the futile argument whether it is primary or secondary, whether it is a disease, or a symptom-complex, or merely an infantile reaction to the factors producing anemia! As in the case of erythroblastosis fetalis, the blood picture is regarded as the expression of a pathologic entity. We may, on the other hand, consider the picture in its relation to pathologically altered processes, and attention is now directed toward a study of these processes, especially how they have been altered by the etiologic factors present in infancy to produce on the one hand the common hypochromic anemia, and on the other the von Jaksch picture.

In the discussion that follows, the processes under consideration are classified under four general headings: (1) Hemoglobin synthesis, (2) hemopoietic activity, (3) hemolysis, (4) disturbance in maturation. It must be realized at the outset that this is not a system for the classification of anemia, nor is it intended at the present time to be the basis for one. It is true that in many cases, the clear predominance of one or another process does actually allow for such a system and we may speak of hypochromic anemias, "hypoplastic" or aplastic anemias, hemolytic anemias, and erythroblastic anemias. The clear

predominance of one process does not, however, preclude the possibility that some other processes may be present, and may actually be of greater importance in its influence on the course of the disease.

1. Hemoglobin deficiency may result from lack of material for its formation or because of failure of synthesis. There is a tendency at the present time to regard *hypochromic* anemia as synonymous with *iron deficiency anemia,* partly because of the outstanding success of iron therapy and partly because the etiologic factors associated with the more severe grades of hypochromic anemia are such as to lead to iron deficiency. It must be stressed, however, that mere lack of iron is not the only factor, but that availability of iron may be quite as important, as well as failure of synthesis even when all the materials for synthesis are present. (At the present time studies of availability require tedious and expensive balance experiments, and even then it is difficult to determine whether iron is not used because it is rendered for some reason unavailable or because hemoglobin formation is depressed.)

The most clearly understood etiologic factors are those associated with iron deficiency: Prematurity; anemia of the mother during pregnancy; rapid growth; diet low in iron; gastrointestinal disturbance leading to interference with absorption as in dysentery and celiac disease, or associated with hypochlorhydria; loss of iron from the body as in hemorrhage or in chronic blood loss. The part played by infection and many other conditions leading to hypochromia is not at all understood.

2. The capacity of the hemopoietic tissue to respond to stimulation or to the need for blood replacement is essential to a cure of anemia, so that a determination of reticulocytes should be a necessary part of any study of the blood. At the present time reticulocyte counts are much too seldom made. It should be borne in mind, however, that a certain degree of anemia must be present before a rise in reticulocytes may be expected, so that failure to obtain a rise after stimulation when the hemoglobin is above 50 per cent (7 gm. per 100 c.c.) is not to be taken as evidence of depressed hemopoietic activity.

For example, in the normal infant shortly after birth there occurs an almost complete disappearance of reticulocytes and failure of reticulocyte response on stimulation. This is during the rapid fall in hemoglobin and red cells that takes place at this time. It has been interpreted as due to bone marrow depression. A more reasonable explanation appears to be that as long as the red cells and hemoglobin are above the normal, regeneration is not needed and the signs of it disappear. As soon as the fall in hemoglobin is completed reticulocytes again appear, their numbers depending at least to some extent on the amount by which the fall in hemoglobin has "overshot the mark," resulting in some degree of "physiologic" anemia. In certain cases

of anemia of the newborn without erythroblastosis in which the cause appears to be an exaggeration of the normal factors, the reticulocytes reappear much earlier and at a time when normally they would be almost completely absent. That is, the need for regeneration has taken place earlier and the rise of reticulocytes is coincident with the beginning of spontaneous recovery.

The older method of judging the extent of regeneration by polychromatophilia, basophilic stippling, and the presence of nucleated red cells is of course satisfactory. The advantage of the reticulocyte count is that we have a more exact measure of the amount of regeneration and we are independent of the vagaries of stains.* Signs of increased regeneration in the absence of hemorrhage or of specific stimulaton should always arouse a suspicion of the presence of increased hemolysis.

When regeneration is intense, a few nucleated red cells may appear. These are to be expected especially at the time of beginning recovery after a severe hemorrhage or an acute hemolytic crisis. They are also encountered in the recovery phase of anemia of the newborn. Their persistence or their occurrence during an acute exacerbation in a chronic anemia probably always indicates a disturbance in erythropoiesis (to be discussed later).

It is difficult to give any exact expression to the lack of adequate regeneration; it is the term "adequate" that makes the difficulty. Lack of any regeneration is easy to recognize; our difficulties begin when we must evaluate the lack of regeneration in relation to the need. It is probably not possible to do this at the present time in all cases. The principal signs are reduction in platelets and white cells, absence of nucleated red cells, a reticulocyte percentage that is lower than should be expected under the conditions that exist at the time of examination. From these characteristics we infer depression of hemopoietic activity, but the inference will usually be made with some reservations, and must depend largely on an evaluation of need as in the case of the newborn period cited above.

The term "hypoplasia" or "hypoplastic" type of anemia is being used to designate inadequate regeneration. The term is borrowed from pathologic anatomy where it has a specific meaning. It is, therefore, not a good term but its widespread use and the fact that it does not

*The technique for counting reticulocytes which I have found most useful is the following: A clean slide is prepared with a film of cresyl blue. This film should be considerably thicker than that used for the usual supravital staining, and should cause staining of the white cell nuclei. A very small drop of blood is taken on a clean cover slip and inverted onto the prepared slide. Care must be taken to avoid so large a drop that the red cells overlap or form rouleaux. Several different portions of the preparation should be examined, and if there is an irregular distribution, portions should be chosen in which there is a minimum of overlapping of red cells. The count should be made within about twenty minutes. Both those cells with net structure and those in which the particles are discrete should be counted. The technique by which permanent reticulocyte preparations are made may give lower percentages and should not be used for quantitative estimations.

commit one too deeply make it convenient. It should be enclosed by quotation marks when used to designate an unproved inference from the blood picture.

There are three conditions under which lack of adequate regeneration may occur: (a) Aplastic anemia; (b) bone marrow replacement; (c) lack of adequate stimulation.

In aplastic anemia there is failure of development of blood cells not only in the bone marrow itself but also in those places where extra medullary hemopoiesis might occur, i.e., the disturbance affects the entire mechanism of blood formation. This happens not only in aplastic anemia in a strict sense but also in acute leucemia, so that the blood pictures in these two conditions may often be quite similar. Since in children a process affecting one element of the blood usually also affects the other elements, aplasia of red cells only or white cells only (agranulocytosis) is rare.

The etiologic factors causing aplastic anemia are not understood, nor are we able to influence the process therapeutically. The use of repeated transfusions has occasionally been followed by recovery and there is always the chance that if life is preserved sufficiently long the patient may be able to bring his blood formation up to a level compatible with life, if not to return it to normal.

In the case of bone marrow replacement the blood picture may have no resemblance to aplasia whatever, even though the normal hemopoietic tissue may be practically completely destroyed. The difference probably lies in the possibility of the development of extra medullary foci of blood formation, so that combined with some elements of hypoplasia are others pointing to intense activity. One might call it quantitative aplasia and qualitative hyperplasia.

Pictures characteristic of bone marrow replacement have been described in tumor metastases to the bone marrow, in osteosclerosis, in cases of generalized xanthomatosis, occasionally in Hodgkin's disease, and I have seen the picture twice in congenital syphilis in which the bone marrow had suffered widespread replacement by syphilitic connective tissue, and there had at the same time developed an extraordinary degree of extra medullary hemopoiesis. The characteristic picture is that of reduction of the blood elements with marked immaturity of white and red cells. This picture is usually encountered only when the bone marrow is largely replaced but earlier in the course one may see the beginnings of the tendency to immaturity, or there may be no changes of note except possibly a slight anemia with or without a reduction in platelets and tendency to petechiae.

The third factor in "hypoplasia" is the rather hypothetical lack of stimulation. There can be little doubt that hemopoietic activity is subject to some sort of control, though the mechanism by which such control is effected is unknown. In a number of conditions there is a

tendency to an aregenerative form of anemia, often with low white count and low platelets. These conditions are those associated with disease involving the spleen and reticuloendothelial system, particularly cirrhosis of the liver, splenic vein thrombosis, Gaucher's disease, Hodgkin's disease, and a group of cases classified under reticuloendotheliosis. Splenic anemia gives us a convenient term by which to designate this group of cases. It suggests a real relation between the spleen and the particular form of anemia that is present, an idea that has much to commend it. The objections to its use to designate a rather hypothetical first stage in a rather hypothetical Banti's disease are obvious. After all, splenic anemia was used for this group long before Banti's disease became popular. If Banti's disease is an entity and not just an anatomic end-result, it is merely one of the conditions in which this blood picture occurs in an early stage.*

It may be questioned whether the blood picture is the result of a failure of hemopoietic stimulation, since in many of these conditions the bone marrow is actually involved in the disease process, notably Gaucher's disease, Hodgkin's disease, and reticuloendotheliosis. Castle and Minot place these conditions among those that cause anemia through direct involvement of the bone marrow. The improvement that takes place in the blood picture after splenectomy is a fact that cannot be ignored, and such improvement has occurred even though the bone marrow involvement has progressed.

In actual practice the conditions thus far discussed are not common. Perhaps the most common cause of "hypoplasia" is infection, although in chronic cases it is often difficult to find any evidence for it. These chronic cases with "hypoplastic" picture are among the most obscure conditions with which one has to deal, and there is no treatment that can be relied on to influence the process. Occasionally a biopsy on a lymph gland or bone marrow may show an increase in reticuloendothelial cells, but to class the case under reticuloendotheliosis does not add one bit to our understanding. In acute septic infections, "hypoplasia" is not so very uncommon though the most striking occurrence may be reduction in myeloid cells and the case be called agranulocytosis. The pictures associated with infections, however, may be quite bizarre owing to the fact that there are often disturbances in several processes so that in addition to "hypoplasia," there may be increased hemolysis and tendency to immaturity.

An example of "hypoplasia" in an acute infection is afforded by a case that I was able to study a few years ago. A child was admitted to the hospital with severe pneumonia. There was leucopenia and thrombopenia, and reduction in reticulocytes. There was at the same time a moderate increase in rate of hemolysis, and the red cells and

*In the *Quarterly Cumulative Index* "splenic anemia" is used as I have used it here; Naegeli uses the term "hypersplenie" to designate the inhibitory action of the spleen; "splenic syndrome" is also used to designate this hematologic picture.

hemoglobin fell with great rapidity. Two days later the entire picture changed. The white count rose to 28,000, platelets were numerous, the reticulocytes rose and the child rapidly became better. It was as if some inhibiting factor had suddenly been removed.

3. Hemolysis. Transitory increase in the rate of blood destruction up to two or three times the normal is very common, but generally is of little importance, so that the recognition of these milder grades of hemolysis has little clinical significance. The recognition of increased hemolysis when this is the predominant process responsible for anemia is usually not attended with any difficulty, though it is worth emphasizing that jaundice may be absent in such cases especially in infancy. When the hemolytic process is slight in extent or is obscured by the dominance of some other process it is likely to be overlooked.

A child of two years was admitted to the dispensary with anemia and splenomegaly but without jaundice. The red cells were reduced to 2.4 million and the hemoglobin to 35 per cent. The white cells numbered about 6,000 and the differential was normal. The blood smear showed anisocytosis with a predominance of microcytes, polychromatophilia, basophilic stippling, and a few normoblasts. The blood picture improved after administration of iron, and the diagnosis was made of nutritional anemia. It was not until five years later that the condition was correctly diagnosed as congenital hemolytic jaundice, although at the initial examination there was clear evidence in the blood smear that a hemolytic process was present. The physician who saw the case allowed himself to be confused by the absence of jaundice and the presence of a disturbance in hemoglobin formation and ignored the signs of marked regeneration that indicated increased hemolysis.

The recognition of increased hemolysis and the conditions under which it occurs have recently been reviewed, so that I need not take up this question here. It should, however, be emphasized (1) that urobilin in the urine without bile, and an indirect van den Bergh may be present with injury to the liver and with no increase in blood destruction, and (2) that iron deposits in the tissues do not necessarily indicate previous increased blood destruction.

4. Disturbance in maturation. Two conditions under which erythroblasts appear in the circulating blood have already been mentioned, namely: (1) Marked stimulation of a normal marrow as after hemorrhage or at the onset of the recovery phase in an acute hemolytic anemia, (2) extra medullary blood formation in cases in which the total functioning marrow tissue has been seriously reduced by encroachment. The third condition is that of a disturbance in erythropoiesis interfering with maturation, the degree of immaturity depending on the depth of the disturbance. There is no sharp line to be drawn between the normal and the pathologic and it is perfectly pos-

sible to regard the increase in reticulocytes as the first stage of immaturity. For convenience we may divide the erythroblastosis into four levels: (1) That in which normoblasts appear only on the occasion of excessive stimulation or during the crises of a hemolytic anemia; (2) that characterized by the more or less continued presence of normoblasts with occasionally more immature erythroblasts; (3) that in which immature erythroblasts form an integral part of the picture; and (4) that in which there may be present the forerunners of the red cells—the macroblasts or megaloblasts. This division is a very loose one and should be considered only as a general grouping of the blood pictures according to the degree of erythroblastosis or, to go a step further, according to the depth of erythropoietic disturbance. Generally speaking, the three major entities among the hemolytic anemias of constitutional origin can be grouped in accordance with the first three levels: Congenital hemolytic jaundice at level 1; sickle-cell anemia at level 2; and Mediterranean anemia at level 3; but this does not mean that erythroblastosis at any particular level is the exclusive property of the condition for which that particular degree of immaturity is more or less characteristic. Thus in congenital hemolytic jaundice, one may see marked erythroblastic pictures especially in infancy, and the same is even more true of sickle-cell anemia. Also, there are occasional cases among the hemolytic erythroblastic group of anemias that do not belong to any one of these clearly defined entities, in which erythroblastosis may predominate in the picture. There is no name for these cases nor is a name desirable except for purposes of filing. We may not understand what it going on or what factors may be causing the disturbance, but tedious discussions over what to call it, or the use of such a name as "acquired hemolytic jaundice," do not advance our understanding in the slightest degree. Pictures similar to those of Mediterranean anemia have been encountered in lead poisoning, Hodgkin's disease, and celiac disease. This point has been stressed because of a tendency to regard blood pictures as specific for disease entities. They are specific only so far as the particular processes of which they are the result are specific for a disease entity. The claim of Mediterranean anemia to be considered an entity does not rest on erythroblastosis even in an Italian child and even accompanied by characteristic changes in the bones, but on its congenital and familial nature and probably even more specifically on the defects in red cell structure described by Cooley in exactly the same way that sickle-cell anemia and congenital hemolytic jaundice are recognized on the basis of characteristic changes in red cell structure.

In the cases dependent primarily on constitutional factors, the immaturity rarely reaches the level represented by the presence of megaloblasts, though occasionally megaloblasts have been seen in Mediterranean anemia, and in the other forms in infancy. The cases

in which macroblasts or megaloblasts are a feature are those in which the principal factors are infectious or nutritional. These cells are encountered in severe anemia associated with syphilis, sepsis, and malaria, but particularly in that form of anemia classed under the name von Jaksch, which from recent investigations appears often to be an expression of a nutritional deficiency, though the possibility that constitutional and infectious factors may be present cannot be denied.

It is very evident from the discussion of disturbance in maturation that there is a close relationship between this and increased hemolysis. From my own experience I should draw the conclusion that it is impossible to separate the two and that one should speak of the hemolytic-erythroblastic group of anemias though in individual cases it may be possible to say that the one is hemolytic and the other erythroblastic, meaning that one is predominantly hemolytic and the other predominantly due to disturbance in maturation. Unfortunately, the possibility of confusion does not stop at this point. (1) It has already been stated that the presence of a process affecting one element of the blood often affects others as well. Accordingly, increase in regeneration may be accompanied by increase in white cells, and erythroblastosis may be accompanied by marked immaturity of the white cells, to which the name pseudoleucemia has been given. This picture is encountered especially in septic infections particularly in small babies, and is seldom seen beyond infancy. (2) "Hypoplasia" may be present, as we have seen, in infections, but it also occurs in the majority of cases in which the immaturity is at the so-called megaloblastic level. As a result we have a picture in which there is combined extreme immaturity of red cells with relatively low reticulocyte counts, leucopenia, and thrombopenia. In general, the red cells in these cases tend to be large so that such pictures are usually classed as pernicious. Again it must be emphasized that this condition must be evaluated in relation to the processes of which it is the result, and it indicates the entity "pernicious anemia" only if the processes which produce it are those which produce pernicious anemia. The tendency at the present time is to consider the pernicious picture as more or less specific and dependent on a deficiency similar if not identical with Castle's extrinsic factor and associated with gastrointestinal disturbance; but it must be borne in mind that it also occurs under conditions not demonstrably associated with deficiency and is often cured by a single transfusion or even after administration of iron.

It was said earlier that this method of evaluating processes would not lead to classification and it must be clear by this time that it is not intended that it should. The relations between the processes are constantly shifting with the progression or remission of the disease, as new etiologic factors cause new disturbances or as improvement in one process may unmask some other process previously unsuspected.

The case must be evaluated as a whole and each characteristic must be considered in relation to the light it may throw on the nature of the disturbances and the etiologic factors that play a part in creating the disturbances. We see a hypochromic anemia develop from a von Jaksch picture. This does not mean a new disease developing out of the old one; it may merely mean that as the disturbance in maturation is overcome a rise in red cells has "unmasked" a disturbance in hemoglobin production. Analogously, lymphosarcoma does not become leucemia, but a process that had been localized becomes generalized and involves blood forming tissue. If one wishes to call the localized process lymphosarcoma and the generalized one leucemia, that is within one's rights. What one calls it is not important compared with the understanding of the nature of the process. All we ask of a name is that it bear some relation to the essential nature of the condition; possibly it is asking too much at a time when congenital hemolytic jaundice is discussed along with diseases of the liver; when hemoglobinuria is classed with urinary disturbances; and a peculiar form of anemia can be called splenomegalic pernicious anemia without any effort to determine the essential nature of the disturbance.

THE INCIDENCE OF HEART DISEASE IN CASES OF SYDENHAM CHOREA

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IN RECENT years some question has been raised as to the clear-cut relationship between Sydenham chorea and rheumatic infection. In the absence of a specific etiologic agent for rheumatic fever, the relationship has been studied from the point of view of symptoms, course, and sequelae observed in both conditions. Since cardiac involvement is by far the most dominant feature and the typical sequence of rheumatic fever, the incidence of this feature has been studied in chorea and correlated with similar findings in rheumatic infection. On this point the literature presents divergent and confusing views.

In a study of 808 cases of chorea, Thayer[1] states that the incidence of heart disease is 27.7 per cent. Abt and Levinson[2] found an incidence of 37 per cent; Frazer,[3] 63 per cent; Koplik,[4] 72 per cent; Strong[5] reported a 42.2 per cent incidence of heart disease in those having the first attack of chorea and 51.7 per cent in those with repeated attacks. In Schwartz and Leader's[6] follow-up of 75 cases of pure chorea, the percentage with murmurs increased the longer the children were followed; the series, however, was not a consecutive one. It may, therefore, be that those followed longest were those whose heart disease brought them to the physician. Gerstley and his associates[7] report a study of 150 children with chorea and conclude that observation of these children over a period of years demonstrates that endocarditis is by no means an invariable complication of chorea but almost exclusively a sequel of true rheumatic and tonsillar infection. On the basis of this study Gerstley and his associates feel that rheumatic fever and chorea "are not as cause-and-effect but as concomitants in the same type of child." More recently, Jones and Bland[8] have reported a comparative study of 482 patients with chorea and 518 with rheumatic manifestations other than chorea. They found that the incidence of heart disease in patients with chorea was 3 per cent as compared with 73 per cent incidence in children who had chorea and other manifestations of rheumatic fever.

The purpose of this paper is twofold: (1) To analyze the incidence of heart disease in a group of children presenting a history of one or more attacks of Sydenham chorea uncomplicated by any other rheumatic manifestations. (2) To compare this incidence with the incidence of heart disease in a group of children presenting histories of chorea plus other manifestations of rheumatism.*

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*In taking histories on our cases we followed the criteria of the New York Heart Association.

SOURCE OF MATERIAL AND METHODS

Our cases were collected over a period of three years from the admissions to the pediatric department at the Kings County Hospital. These children belonged to the poor class of the community. The majority were of Jewish and Italian extraction. The sexes were equally represented and the ages ranged between five and thirteen years.

Upon admission to the hospital each child was examined by one of us and the diagnosis reaffirmed in a subsequent examination the following day by another of us. A routine work-up was instituted consisting of a careful physical examination, blood count, erythrocyte sedimentation rate, urine examination, teleroentgenogram, and electrocardiogram. In the last two years right and left anterior oblique plates were also taken.

Our cases fell into two main groups: (1) children who presented a history of one or more attacks of chorea—"pure chorea"; (2) children who presented a history of chorea but also had a history of other rheumatic manifestations.*

Our criteria for heart disease were as follows:

1. Definite Heart Disease.

Cases presenting definite valvular murmurs and cardiac enlargement by roentgen studies (Figs. 1, 2, 3) were considered as having heart disease.

2. Borderline Cases.

Those cases which presented equivocal auscultatory signs and questionable cardiac enlargement by roentgenogram (Figs. 4, 5, 6) were considered as borderline cases.

3. No Heart Disease.

Cases which presented equivocal auscultatory signs and negative x-ray silhouettes (Figs. 7, 8, 9) were considered as negative for heart disease.

ANALYSIS OF DATA

The group of children presented in this study consisted of 53 boys and 59 girls, 107 white and 5 negroes. The ages ranged between three and thirteen years with the largest number between seven and eleven. All the children belonged to the poorer class of our community. The majority were of Jewish and Italian extraction. An investigation of a group of our patients showed that in almost every home there were stresses due to the presence of poverty, divorce, alcoholism, or crime.† Nothing unusual was noted in the history of past illnesses in our group. One case followed immediately after scarlet fever. One child had a positive Wassermann reaction. Four cases had pulmonary tuberculosis.

*In taking histories on our cases we followed the criteria of the New York Heart Association.

†Such home conditions were found to be common in any group of children admitted to our hospital.

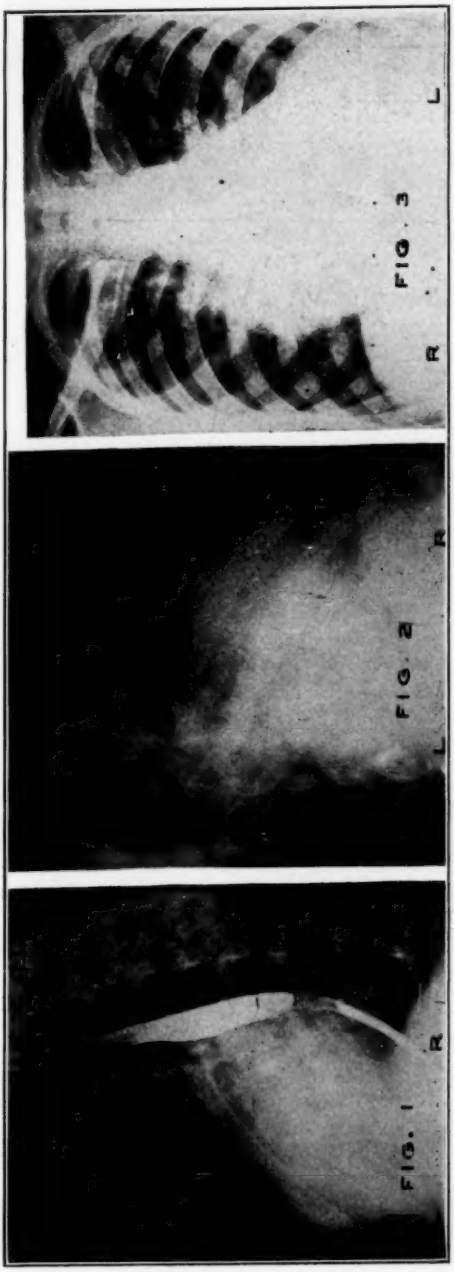

Fig. 1.—Esophagram showing marked enlargement of the left auricle.
Fig. 2.—Left anterior oblique roentgenogram showing elevation of left bronchus by enlarged left auricle.
Fig. 3.—Teleroentgenogram showing marked enlargement of the cardiac silhouette.

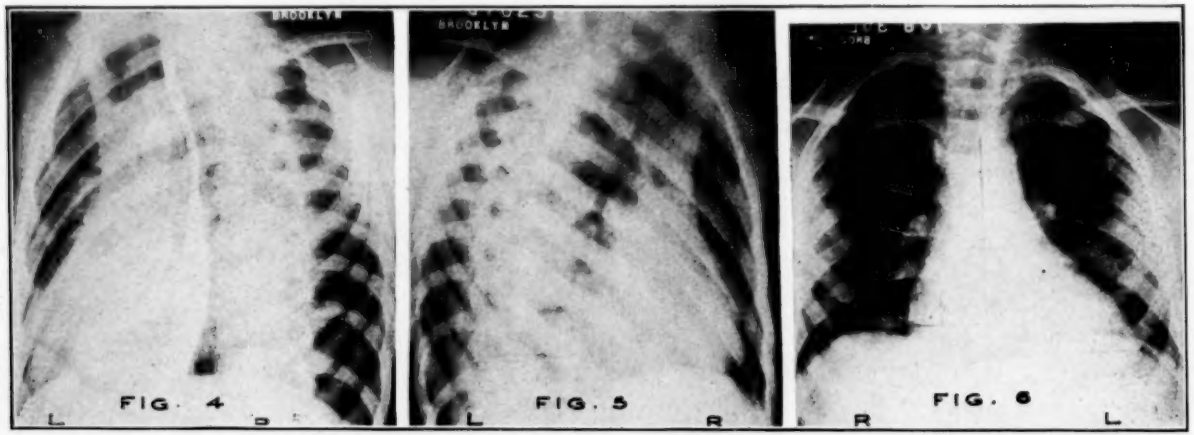

Fig. 4.—Esophagram showing "questionable" enlargement of the left auricle.
Fig. 5.—Left anterior oblique roentgenogram showing slight elevation of the left bronchus.
Fig. 6.—Teleroentgenogram showing slight enlargement of the cardiac silhouette.

FIG. 7.—Esophagram showing a normal cardiac configuration.
FIG. 8.—Left anterior oblique roentgenogram showing no elevation of the left bronchus.
FIG. 9.—Teleroentgenogram showing a normal cardiac silhouette.

Seventeen cases were classified as mild chorea; the others were moderate or severe cases of chorea. Our treatment was that generally accepted, i.e., rest in bed in a quiet room, warm baths, sedatives. Twenty cases received typhoid vaccine. One hundred and five children of this group were discharged from the hospital as improved after an average stay of fifty days; 3 were discharged as unimproved; four died. Of the four children who died in the hospital, 3 died in acute decompensation; one died during an attack of hyperpyrexia (110°) shortly after the fourth inoculation with typhoid vaccine.

Of the total number of 112 children studied, 78 presented a history of chorea without rheumatic manifestations and 34 were mixed cases, i.e., children who presented a history of chorea plus other rheumatic manifestations. Fifty children were studied during the first attack of chorea and twenty-eight had had one or more attacks of chorea previously.

Following the clinical criteria for heart disease outlined above, we found that among the children observed during the first attack of chorea more than one-third had definite cardiac involvement, more than one-half had questionable cardiac involvement, and only four children (8 per cent) were definitely free of heart disease. Of the group of children who presented a history of more than one attack of chorea, 39 per cent had definite cardiac involvement, 39 per cent had questionable heart disease, and 21 per cent were definitely free of heart disease. Of the mixed group of cases, two-thirds of the children had definite cardiac involvement (Table I).

We were impressed with the fact that, if we analyzed our cases from the point of view of positive roentgen evidence of heart disease, the incidence of cardiac involvement found in children presenting a history of chorea rose to even higher figures. While we did not succeed in studying all our cases in this manner, those studied show significant findings. Of the group with "pure chorea" first attacks, 42.8 per cent

TABLE I

HEART DISEASE IN CHOREA

		PURE CHOREA FIRST ATTACK	PURE CHOREA REPEATED ATTACKS	MIXED CASES	TOTAL
TOTAL		50	28	34	112
CLINICAL HEART DISEASE	Negative	4 (8%)	6 (21%)	6 (17%)	16 (14.2%)
	Questionable	28 (56%)	11 (39%)	5 (14%)	44 (39.2%)
	Positive	18 (36%)	11 (39%)	23 (67%)	52 (46.4%)
ADDITIONAL POSITIVE ROENTGEN CASES		9	3	3	15
TOTAL HEART DISEASE		27 (54%)	14 (50%)	26 (76.4%)	67 (59.8%)
PURE CHOREA VS. MIXED CASES		41 (52.5%)		26 (76.4%)	
CALCULATED TOTAL HEART DISEASE IF ALL CASES HAD ROENTGENOGRAMS		51 (65.3%)		26.3 (77.3%)	77.3 (69%)

had positive roentgen evidence of cardiac involvement; of the group with "pure chorea" repeated attacks, 66.6 per cent had positive roentgen plates; and of the mixed group, 67.7 per cent had positive roentgen plates. If we compare the "pure chorea" group with the mixed group, we find that more than one-half of the former had definite roentgen evidence of cardiac involvement and more than two-thirds of the latter showed the same evidence. This parallelism becomes more striking when we study our cases from the point of view of esophagrams only. Of the "pure chorea" group, 62.9 per cent had positive esophagrams; and of the mixed group, 73.6 per cent (Table II). If all our cases had

TABLE II

HEART DISEASE IN CHOREA

ROENTGEN STUDY

		PURE CHOREA FIRST ATTACK	PURE CHOREA REPEATED ATTACKS	MIXED CASES	TOTAL
ROENTGENOGRAM LEFT OBLIQUE OR RIGHT OBLIQUE	Taken	28	21	31	80
	Positive	12 (42.8%)	14 (66.6%)	21 (67.7%)	47 (58.7%)
PURE CHOREA VS. MIXED CASES		26 (53.06%)		21 (67.7%)	
POSITIVE ESOPHAGRAMS	Taken	27		19	46
	Positive	17 (62.9%)		14 (73.6%)	31 (67.3%)

been studied by means of roentgen plates and the percentage incidence of positive cardiac involvement would remain constant, the calculated percentage incidence of heart disease would rise to 65.3 per cent in the group of "pure chorea" cases and to 77.3 per cent in the mixed group (Table I and Fig. 10).

DISCUSSION

Many theories have been advanced, from severe shock of a physical or mental nature to multiple cortical emboli, to explain the pathologic physiology of chorea. Peripheral irritation such as eyestrain or intestinal worms have been charged as of causal relation. There seems no doubt that in certain individuals various peripheral irritants may start or aggravate choreaform symptoms. One of us (P) observed in private practice two brothers, eight and nine years of age respectively, who had severe chorea of two weeks duration. They did not present any previous history of rheumatism. The blood picture showed a high eosinophilia. Intestinal worms were suspected. Following the appropriate medication many pin worms were expelled. Within a few days all signs of chorea had cleared. One of us (P) had occasion to observe these children for several years. Both children developed chronic valvular heart disease without any recurrences of rheumatic manifestations.

Since the time of Sydenham little has been added to the clinical picture of chorea. Surprisingly few thorough pathologic studies have been made to explain the bizarre symptoms. In the absence of consistent reports showing similar pathology in the few brains studied histologically, the pathology of the disease remains in a state of confusion. The etiology of the disease stands unknown. The sequelae of this condition, we believe, run parallel to those found in rheumatic infection.

We realize that the material presented in this paper has been followed for a period of only three years. One of us (P), however, followed a series of 28 cases in private practice for a period of five to twenty years and his findings concur with the older observations, namely that the incidence of heart disease of a rheumatic nature in cases of chorea is high. But twelve of the 28 patients can be said to have

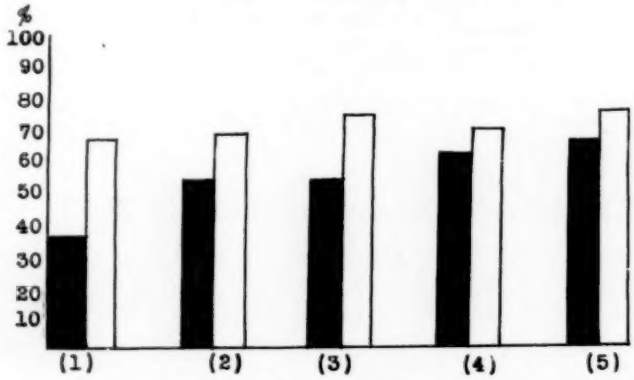

Fig. 10.—Cardiac involvement in chorea. The solid column represents cases with "pure chorea." The blank columns represent the "mixed" cases.
(1), Incidence of clinical cardiac involvement.
(2), Roentgen evidence of cardiac involvement.
(3), Roentgen plus clinical evidence of cardiac involvement.
(4), Positive esophagrams.
(5), Calculated total cardiac involvement if roentgenograms had been taken in all cases.

recovered. The remaining 16 patients show at present permanent cardiac damage of a rheumatic nature. He also observed that the greater majority of those patients who apparently escaped cardiac damage show nervous tremors and are unable to concentrate for many years following the disease.

Gerstley and his associates[7] agree that children presenting a history of chorea come from an environment which seems to favor rheumatic infection and that it occurs in approximately the same age group. They suggest that since the two conditions are favored by similar environmental factors, it is logical that rheumatic infection should have been listed in the etiology of chorea. The most common and by far the most

important and typical sequela of rheumatic infection is cardiac involvement. This complication, according to Gerstley and his associates, does not occur in "pure chorea" cases unless they have other rheumatic manifestations or tonsillitis. Jones and Bland[8] find only a 3 per cent incidence of cardiac involvement in "pure chorea" cases. It would seem from these studies that chorea and rheumatic fever are separate and distinct entities.

The facts derived from an analysis of our cases are definitely at variance with the above mentioned opinions. When definite criteria for cardiac involvement are established and applied to our group of cases, we find that the incidence of cardiac involvement in children who present a history of chorea uncomplicated by other manifestations of rheumatism is almost as high as in any group of children with rheumatic diathesis. Our figures agree with the older observations of Frazer[3] and Koplik.[4] Our facts lead us to the conclusion that until the etiologic agent for rheumatism and chorea is known, it is reasonable to assume that chorea is one of the rheumatic manifestations. The two conditions occur in the same type of child under similar environmental factors. The incidence of cardiac involvement is almost equal in both conditions. We, therefore, fail to see why chorea should be excluded from the list of rheumatic infections.

SUMMARY

1. One hundred and twelve children presenting a history of chorea have been analyzed from the point of view of cardiac involvement.

2. Definite criteria for cardiac involvement are presented.

3. Seventy-eight children presented histories of "pure chorea"; 34 of the children were mixed cases.

4. The incidence of cardiac involvement in the group was 59.8 per cent.

5. The incidence of cardiac involvement in the "pure chorea" group was 52.5 per cent and in the mixed group 76.4 per cent.

6. Esophagram studies show a greater parallelism between the two groups in the incidence of cardiac involvement.

7. Twenty-eight cases of pure chorea followed clinically by one of us over a period of many years showed an incidence of 57.1 per cent of cardiac involvement.

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SEASONAL VARIATIONS IN CAPILLARY RESISTANCE OF INSTITUTION CHILDREN

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THIS article presents the results of repeated tests of the capillary resistance of a group of institution children which were carried out over the period of a calendar year. Interest in this problem was aroused through the work of Göthlin,[1, 2] Dalldorf,[3, 4] and others who have reported a relation between capillary fragility and the body's store of vitamin C, and have suggested this method as a means of detecting subclinical scurvy. In connection with another investigation under way in this institution the opportunity was afforded to follow the capillary resistance of the children during the year to determine whether a relation between the strength of the capillaries and the vitamin C content of the diet as reported by others could be demonstrated. The historic development of this theory, the description of the methods used, and the details of results have been so fully reviewed[2, 3] that it is necessary here to summarize only the evidence to date for and against this alleged relationship.

LITERATURE

There is a considerable body of evidence supporting the claim that the capillary walls are weakened in vitamin C deficiency and that the capillary resistance test is of value in determining the body's store of this vitamin. The earliest workers used the method of positive pressure. As early as 1914 Hess[5] showed that the capillaries of children with scurvy give way under pressure that those of normal children are able to withstand. He recognized that the test was not specific for scurvy and expressed doubt as to whether the test would ever be of diagnostic value for this disease. Öhnell[6, 7] was the first to suggest the possible use of the test in diagnosing subclinical scurvy. He reports 17 cases of manifest scurvy and 5 cases of latent scurvy—the latter being determined by the capillary resistance test—which showed improvement and in some cases a return to normal, under dietetic treatment.

In 1931 Göthlin[1] standardized the positive pressure method and from his laboratory has come some of the strongest evidence for the validity of the test. In a group of 50 school children 11 were found to have subnormal resistance. Six of these were given an orange a day for

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three to five weeks, with the results that 4 became normal, one improved, and one became worse. Two others were left untreated during the summer vacation and when retested in the fall were found to have normal resistance. Göthlin attributed the cure to the increased vitamin C in the summer diet. He admits that vitamin D from sunshine might have been a factor in the recovery, but believes it to be due rather to vitamin C. He also mentions another case which became normal after being given oranges for two months (March and April). Göthlin's most specific work is that reported on two demented patients who were put on a scorbutic diet and then fed graded doses of orange juice in order to determine their requirement. The resistance of these patients decreased during the six weeks on the deficient diet, but came back to normal after about two months of vitamin therapy. In one case it required 0.7 c.c., in the other, 1 c.c. of orange juice per kilogram to effect the recovery.

Indirect evidence was also afforded by Göthlin and his coworkers through studies of the relation of resistance to season and to the diet. In 1932 Gedda[8] tested 24 university students at Upsala in September and again in May. All were within the normal limits as set by Göthlin (not over 8 petechiae at 50 mm. Hg pressure for 15 minutes), but the majority showed a greater number of petechiae in May; that is, 19 of the 24 students had more, two were unchanged, and 3 had fewer. The total number of petechiae for the group had doubled, being 54 in September and 104 in May. The decreased resistance was believed to be due to the lower vitamin C content of the winter diet. In one case it was found that 2 oranges given daily for one month (May) caused a decrease in the number of petechiae. Falk, Gedda, and Göthlin (1932)[9] also report capillary fragility in 13 out of 89 children examined in 5 localities north of the Arctic Circle. A study of the diets revealed some degree of correspondence between low resistance and vitamin C undernourishment. In keeping with these studies is that of Urbye[10] who in a survey of school children in another Swedish district found evidences of vitamin C deficiency. This was judged by the finding that the capillary resistance was greater in the spring than in the autumn.

Schultzer has utilized Göthlin's method in a number of studies of hospital patients, and has shown that capillary fragility is common in cases of achylia, ulcer, colitis, and other gastrointestinal disorders. He believes that this can be correlated with the low vitamin C diets prescribed in such cases. In one study[11] of 42 cases of abnormal fragility he concludes that 25 were due to vitamin C deficiency since they were restored to normal by vitamin therapy. The remainder he attributes to other causes. In another study[12] Schultzer found that of 18 ulcer patients 6 showed decreased resistance when put on the usual ulcer diet; he believes that all would have shown it had the

time been extended. In 17 other cases, it was found that 3 had normal resistance and maintained it even on the ulcer diet; 8 who were low at the beginning remained so or went lower, and of 7 with low resistance who were given 2 to 6 hip tablets daily, each equal to 4 mg. ascorbic acid, all showed improvement. (According to Schultzer's table, however, only 3 seem to the writers to be improved.) In still a third study[13] of 43 achylics, 24 were found to have low resistance. Of these, 17 were given various types of treatment. Four treated with hydrochloric acid showed no change, 6 treated with lemon juice and one with ascorbic acid became normal; 7 given lemon juice showed no change, and three of these who were given ascorbic acid still failed to improve. Schultzer concludes that low resistance may be due to subnutrition of vitamin C or to other causes. If due to dietary deficiency it will respond to vitamin therapy. Schultzer[14] also had the opportunity to study the capillary resistance during progress and recovery of a severe case of scurvy. On intravenous administration of 40 mg. of ascorbic acid daily, the resistance improved and in about one month was entirely normal. It is noted, however, that the number of petechiae decreased from 140 to 20 in five days while the man was still on the scorbutic diet. Schultzer attributes this to the edema which developed. Schultzer[15] has also followed capillary resistance and urinary excretion of vitamin C in three cases of manifest scurvy during vitamin therapy. In all cases resistance returned to normal some time after the clinical symptoms had disappeared.

Several other workers have reported positive results on a few cases by the use of Göthlin's method. Nordenmark[16] found that 86 out of 777 school children (11.1 per cent) in Orebro, Sweden, had low resistance by this test. He treated 8 of these cases with 15 mg. of ascorbic acid daily for three weeks, at the end of which time 3 of the 8 had become normal; two others who were continued on the treatment with the addition of two oranges a day were normal at the end of five weeks. In the New Jersey State Home for Boys, Molitch[17] found 4.3 per cent of 418 boys with subnormal resistance and 6.9 per cent with transitional values. He treated 15 cases with 6 ounces of canned tomato juice daily for three to five weeks and reports that 12 of the 15 showed definite improvement. Wright[18] treated 3 adult subjects showing classical symptoms of scurvy with 60 to 90 mg. of ascorbic acid daily by mouth. He reports rapid improvement in six days, complete restoration to normal in four to five weeks, and "marked decrease in capillary fragility to within normal limits." Stoltenberg,[19] in discussing a paper by Lindquist, reported that 17 children out of 181 examined in two schools showed low resistance. The teachers were asked to write the parents requesting that the children be given milk and one or more oranges a day. When retested a few weeks later, 10 of the 17 children had become normal. Stolten-

berg says, "This investigation speaks in favor of a considerable relation existing between the diet and capillary resistance."

Positive results have also been reported by use of the method of negative pressure. Dalldorf[3] perfected a resistometer of this type and employed it in testing several large groups of subjects. One group of 52 poorly nourished children was also retested after a period on an improved diet which included 100 c.c. of orange juice. All but four showed marked improvement, some of them raising their resistance 20 to 30 cm. of Hg above their original values. Dalldorf and Russell[4] later injected ascorbic acid into individuals with fragile capillaries and found a prompt and prolonged rise in their resistance. This rise was noted one to two hours after the test and it persisted for six to seven hours. Using the same method Schultz[20] followed the resistance of 56 children four to nineteen years of age from January to May. These children had had rheumatic fever. One-half served as controls; the other half were given 100 mg. ascorbic acid daily. There were many individual variations, but the average resistance for the experimental group rose with the administration of the supplement; that of the control fell from January to April and rose again slightly in May. These results are consistent with the theory that the level of resistance is influenced by vitamin C supply.

In spite of this array of evidence for the value of the capillary resistance test, unfavorable results are being reported from a number of laboratories. Utheim-Toverud,[21] in discussing a paper by Lindquist on this subject, reported having used Göthlin's method routinely for a year on patients, especially on pregnant women. No relation between the results of the test and the vitamin C of the diet was observed. Even one case of scurvy, with blood ascorbic acid only 3.3 mg. per 100 c.c., was found to have normal capillary strength. Hawley, Stephens, and Anderson,[22] using negative pressure, studied capillary resistance of 12 adults on varying levels of vitamin C intake, and found no significant differences in the resistance at the different levels. Abt and Farmer[23] using the more precise apparatus of Cutter and Johnson[24] attempted to correlate capillary resistance with blood plasma values for reduced ascorbic acid and also with the dietary histories, but were unable to detect any such relations. Even in cases with low initial blood plasma values, the capillary resistance was not reduced. Increases in plasma values, moreover, were not accompanied by corresponding rise in capillary pressure; in one case it was even decreased. O'Hara and Hauck[25] (1936) tested the capillary resistance of 4 women by both the positive and negative pressure methods in connection with a study of the urinary excretion on various levels of vitamin C intake. They found no agreement between the two methods, and no relation between either method and the vitamin C stores as judged by the urinary excretion.

Weld[26] studied the capillary resistance of two groups of 41 men each, both before and after a supplement of tomato juice, using the method of Dalldorf. Neither group showed any significant change. Negative results were likewise found on 11 other subjects, 3 adults and 8 children. Further experimentation with these 11 subjects, however, revealed the fact that vitamin D, whether given either through sunshine or as viosterol or cod liver oil, did produce a pronounced rise in all but one subject. Weld concludes that the capillary test is not an adequate method of determining subnutrition of vitamin C, and that "vitamin D is a more effective agent than vitamin C in increasing the capillary resistance."

EXPERIMENTAL PROCEDURE

In the present study the negative pressure test was employed using Dalldorf's suction cup instrument. This consists of a small hand pump ending in a broad-rimmed glass cup with an inside diameter of one centimeter. To this instrument is attached a gauge calibrated against a column of mercury so that it registers in centimeters of mercury. In making the test the subject was seated with the arm resting on a table in the same plane as the heart. The broad edge of the cup was moistened with water to insure adhesion to the skin, and was placed on the inner arm just below the elbow, where it was held in place by the subject.

A given pressure was maintained for exactly one minute timed with a stop watch. The pressure recorded was the lowest at which any petechiae occurred. A little experience showed that with the group being tested 15 cm. was the most satisfactory beginning pressure. If petechiae occurred at this pressure, a second test was made next to the first using a pressure of 10 cm. and if petechiae appeared at this level a pressure of 5 cm. was tried. If, however, on the first test at 15 no petechiae were observed, retests were made at successively higher intervals until the lowest level at which they occurred was found.

Before beginning the study proper preliminary tests were made to determine the ability of the observer to check her own results, and the effect of time of day, if any, on the readings. To determine the first, 12 subjects were tested on both arms, and then retested three days later at the same hour and under the same conditions. (Previous trials had shown that tests could be repeated satisfactorily on the same place on the arm after three days.) Of the 24 tests, 14 were the same on both tests, 5 were higher on the second test and 5 were lower. In no case was the difference between tests greater than 5 cm. which was the closest interval used in checking. To ascertain the effect of time of day 23 subjects were tested (1) before they got out of bed, (2) in the midmorning, and (3) late in the afternoon. Although the results were not entirely consistent, there was a tendency for the

values to decrease as the day advanced. This is shown by the fact that the average pressures for the successive periods were 23.2, 21.3, and 19.3 for the right, 25.4, 20.4, and 20.8 for the left arm. Moreover, in comparing midmorning tests with those taken while the child was in bed 26 of the 46 tests were lower, 12 were the same, and only 8 were higher; and the late afternoon tests bore about the same relation to the midmorning ones. In view of these findings it was deemed important that tests for the study should be made at the same time of day. The morning hours, 9 to 12:30, were therefore chosen and successive tests on individuals were made within a half hour of the time of the previous testing.

To eliminate the effect of exercise and temperature—which Göthlin states may affect the readings—the subjects were kept in a quiet room where the testing was done for one-half hour before the test. To insure a standard light the test was made using a lamp with a photo-flood bulb. Since pressures at which petechiae occur had been found to differ on the two arms, tests were made routinely for both right and left arm. Using these methods all the children in the institution were tested five times during the year, namely: (1) late February and early March, (2) April, (3) July, (4) August, and (5) November. Owing to withdrawals and absences from the institution only 85 individuals of the initial 140 were present at all five tests, and 15 others were observed for 4 of the five periods. The remainder have records for two or three readings.

In order to determine the relation, if any, between the capillary resistance and the vitamin C intakes during this time, a study of the diets was made at the different periods. In view of the alleged relation of infection to capillary resistance a record was kept of all colds, other infections, illnesses, and immunizations in order that the incidence of these might also be considered in interpreting the findings.

FINDINGS

The Vitamin C Content of the Diets.—Since the findings for capillary resistance are to be considered in relation to the vitamin C content of the diets, the relative amounts of this vitamin ingested at the different periods deserve first consideration. It is obvious that an accurate estimate of the vitamin C supply could be made only by biologic assay of the diets as actually consumed at the various periods. Since this was out of the question the next best method was employed, namely, that of estimating as accurately as possible the units of vitamin C in the diets. It was fortunate for this purpose that a dietary study was being carried on in the institution in connection with another project, during the period covered by this study. A research worker who lived at the institution made a quantitative study of the diet of one child each week during the greater part of the year. She also kept

a log of everything that pertained to the food intake and health of all the children. For purposes of the present consideration, a week's dietary record for one child was selected from each of the five periods for which capillary resistance was determined. The selection was made on the basis of the diet that appeared most typical of each period, and the vitamin C content of these diets was computed according to the best available data. The results are given in Table I and Chart 1.

TABLE I

APPROXIMATE AMOUNTS OF VITAMIN C IN THE INSTITUTION DIETS AT THE DIFFERENT SEASONS

(EXPRESSED IN SHERMAN UNITS)

TEST I FEB. AND MAR.	TEST II APRIL	TEST III JULY	TEST IV AUG.	TEST V NOV.
20 units	23 units	40 units	62 units	28 units

An analysis of these dietary records shows that for convenience of discussion the diet of the institution may be considered as consisting of a basic diet to which certain supplements were added from time to time. This basic diet was predominantly carbohydrate. It consisted of cereals and sweets (bread, sweet rolls, breakfast cereals, jam), a scant pint of milk a day, potatoes fairly frequently, and small and irregular amounts of meat, butter, fruits, vegetables, and other foods. This is illustrated by a day's diet for a nine-year-old girl in March as given in Table II. Throughout the winter and spring this basic diet was the usual one, but in the summer and early fall it was supplemented by vegetables and fruit from the Home's garden and orchard, and from November to December in the fall of 1934, with an abundance of apples contributed by the government from surplus commodities. The first radishes and lettuce from the garden were served June 9; then followed a large variety of fruits and vegetables (the cooked fruits and vegetables lost most of their vitamin C, however, as they were simmered from three to six hours), the season ending with quantities of tomatoes in August and September, the last of which were used October 6.

From the computations of vitamin C in the typical diets it was found that raw milk and potatoes formed almost the only sources of antiscorbutic in the institution diet for a large portion of the year (October to June). As seen in Table I the estimated amount supplied at these periods was low and much the same for March, April, and November—20, 23, and 28 units respectively—while that for July was nearly twice as great, 40 units, and that for August still greater, 62 units. These estimates are, of course, only rough approximations, but it is believed that they are correct to the extent of indicating relative amounts of vitamin C in the institution diet, at the different seasons.

In making a comparison of the vitamin C intake and the capillary resistance of individuals, however, it must be remembered that for some children the supply of vitamin C in the diets as calculated, was not all that they received. Here, as at most institutions, the weekly visitors brought treats to the children, and these sometimes included

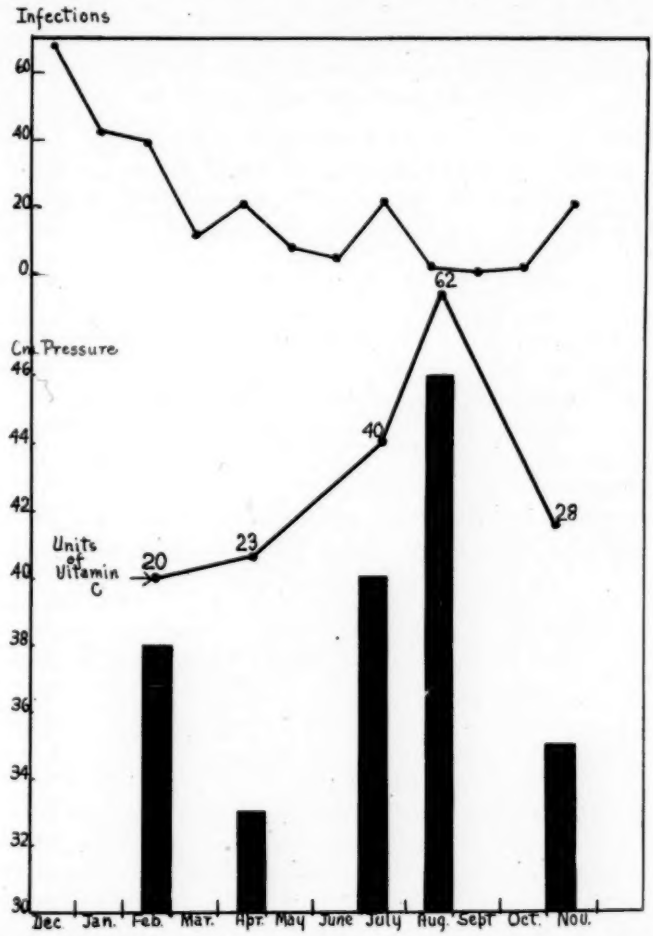

Chart 1.—Mean capillary resistance of 85 institutionalized children at five periods during the year, in relation to incidence of infections and to approximate amount of vitamin C in the diets. Mean pressure is given in centimeters of mercury for the sum of the tests for the two arms. Infections are recorded as the total number of cases for all children during the month. Vitamin C is given in Sherman units, as calculated from actual diets.

fruit. Hence, many children received in this way a small and variable additional amount of vitamin C in the winter months and a larger amount in the summer. It should also be mentioned that in the sum-

mer many of the children had access to raw onions, radishes, and carrots in the garden, and that when tomatoes were in season, a bushel was usually in the kitchen where the children could help themselves freely between meals. It can thus be safely assumed that in the winter the diet as computed was supplemented to a small extent for some children, and that in summer many of the children had a much higher intake of vitamin C than that revealed by the diet study.

Capillary Resistance on the Various Tests and Its Relation to the Vitamin C Supply.—The records of capillary resistance on the various

TABLE II

FOOD INTAKE OF A NINE-YEAR-OLD GIRL FOR FOUR DAYS IN MARCH

THURSDAY		FRIDAY		SATURDAY		SUNDAY	
Breakfast		Breakfast		Breakfast		Breakfast	
FOODS	GM.	FOODS	GM.	FOODS	GM.	FOODS	GM.
Cereal	230	Cereal	210	Cereal	292	Cereal, dry	42
Sugar	9	Sugar	10	Sugar	7	Sugar	11
Bread	55	Bread	57	Bread	30	Bread	56
Jam	16	Jelly	30	Jelly	19	Butter	13
Milk	220	Milk	227	Milk	196	Milk	220
Lunch		Lunch		Lunch		Dinner	
(Carried to school)		(Carried to school)		Thin vegetable soup	211	Meat	36
Bread	90	Bread	132	Crackers	11	Potatoes	149
Jelly	31	Butter	26			Gravy	55
Cookie	18			4:00 P.M. Lunch		Beets	69
		4:00 P.M. Lunch		Bread	30	Bread	13
4:00 P.M. Lunch		Bread	27	Jelly	13	Cornstarch pudding (cherries in it)	117
Bread	60	Jelly	16				
Supper		Supper		Supper		Supper	
Creamed potato	110	Baked beans	252	Rice (milk in it)	424	Stewed prunes and apricots	133
Bread dressing	84	Bread	50	Sugar	20	Bread	42
Bread	56	Butter	10	Bread	32	Jelly	16
Jelly	11	Cornstarch pudding (cherries in it)	88	Jelly	22	Milk	229
		Milk	470				

tests have been analyzed by a number of methods. A comparison has been made first of all between the mean pressures found for the five tests, and the relation of these to the vitamin C supply in the diets at the same periods noted. Since the pressures for the two arms were not always identical, analyses were made for both right and left arms and also for the sum, or average, of the two. The general conclusions for the group were found to be the same regardless of the method of tabulation used. In view of this fact, the results chosen for presentation are those obtained for the sum of the two arms. (This is equivalent to the average, but eliminates fractions resulting from division.) The mean pressures for the group on each of the five tests, as found by this method, are given in Table III and in Chart 1.

TABLE III

MEAN CAPILLARY RESISTANCE FOR 85 CHILDREN ON FIVE TESTS (DETERMINED FOR SUM OF THE TWO ARMS)

TEST	MEAN PRESSURE CM. HG	STANDARD DEVIATION	PROBABLE ERROR
I, Late February and early March	38	11.2	0.820
II, April	33	8.2	0.600
III, July	40	9.0	0.659
IV, August	46	9.3	0.681
V, November	35	9.3	0.681

Even a cursory glance at these records shows that there is a marked parallelism between the mean pressures at which petechiae occurred and the level of antiscorbutic in the diets. Though it must be emphasized at the outset that mere parallelism does not necessarily indicate a cause-and-effect relationship, it is readily apparent that the trend for mean capillary resistance at the different periods is precisely that which would be expected if resistance were directly dependent on the intake of antiscorbutic. The mean pressure is found to be low in February (38 cm.), a period which follows at least two months on a diminished vitamin C intake, and it drops still lower in April (33 cm.), coincident with a more extended period on this low vitamin C diet. It rises again in July (40 cm.) above the February level, and still higher in August (46 cm.), the period when tomatoes and garden produce are abundant and the vitamin C intake reaches its peak. Consistently, moreover, it drops again in November (35 cm.), paralleling the drop in vitamin C at this time. The differences between the means as here recorded are not large, but the statistical comparisons as given in Table IV show that they are significant; all differences between successive periods are more than four times their probable errors, and can hardly, therefore, be attributed to chance.

TABLE IV

STATISTICAL SIGNIFICANCE OF DIFFERENCES BETWEEN MEAN CAPILLARY RESISTANCE FOR SUCCESSIVE TESTS

TESTS COMPARED	DIFFERENCE BETWEEN MEANS	P. E. OF DIFFERENCE	RATIO OF DIFFERENCE TO P. E.
I and II	5	1.02	4.9
II and III	7	0.89	7.8
III and IV	6	0.95	6.3
IV and V	11	0.96	11.4

Precisely the same picture is found when consideration is given to the proportion of the children having high and low resistance on the several tests. The results by this method of analysis are given in Table V and Chart 2. Taking first the extremely low value of only 25 cm. or less for the sum of the two arms, the percentage of children having this low resistance on the several tests shows a decided corre-

TABLE V

PERCENTAGE OF CHILDREN HAVING LOW AND HIGH RESISTANCE ON EACH OF THE FIVE TESTS (VALUES FOR SUM OF TWO ARMS)

TIME OF TEST	25 CM. OR LESS		30 TO 45 CM.		50 CM. OR MORE	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Test I, Feb. and March	16	19	48	56	21	25
Test II, April	23	27	59	69	3	4
Test III, July	7	8	52	61	26	31
Test IV, August	2	2	47	56	36	42
Test V, November	19	22	58	68	8	9

spondence with the vitamin C supply at these periods. This may be observed in the black bars at the left of the chart. The percentage with pressures at this low level is 19 in February, and increases to 27 in April. It drops to 8 in July, and reaches its lowest level of 2 in August. Consistently again, it rises to 22 in November. At the other end of the scale, moreover, the results are the direct converse of these. Taking 50 cm. as a relatively high pressure (indicated by the hatched portion at the right of the chart), the percentage of chil-

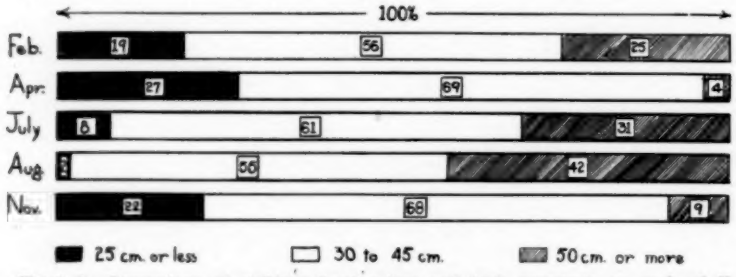

Chart 2.—Percentage of children having low and high pressures on each of the five tests. Pressures recorded in centimeters of mercury for the sum of the tests for the two arms. Note the seasonal trend, i.e., the high proportion of children having pressures of 25 cm. or less in February, April, and November as compared with the small number in July and August. Note also the converse of this picture for the percentage having high pressures (50 cm. or above).

dren with resistance at this level is definitely higher in July and August, the period when the vitamin C supply is at its peak, than it is in the months of more restricted supply—February, April, and November.

For the group as a whole, then, there appears to be a well-marked tendency for the capillary pressure to follow a seasonal pattern, paralleling roughly the level of vitamin C supply. It is important now to inquire, To what extent do the individuals in the group exhibit the same trend? As an aid in answering this question, individual graphs of the pressures on the five tests were made for each child, and these were compared with the typical pattern that would be expected if resistance were directly dependent on the stores of vitamin C. Assuming the estimates of antiscorbutic at the different seasons as already presented in Table I to be approximately correct, this typical pattern would be almost precisely the same as that depicted in Chart

1 for the mean pressures of the group. In order to have an objective method of expressing the degree of correspondence of individuals with this pattern, an analysis was made of the essential characteristics for perfect agreement. The result was an eight point rating scale, as depicted and described in Chart 3.

The individual graphs were then scored on this basis, allowing one point for each item. For convenience of discussion these scores have been combined into four groups and designated as follows:

3 x (Scores of 8 or 7). Typical pattern.
2 x (Scores of 6 or 5). Decided correspondence to pattern.
x (Scores of 4 or 3). Some correspondence to pattern.
0 (Scores of 2, 1, or 0). No correspondence to pattern.

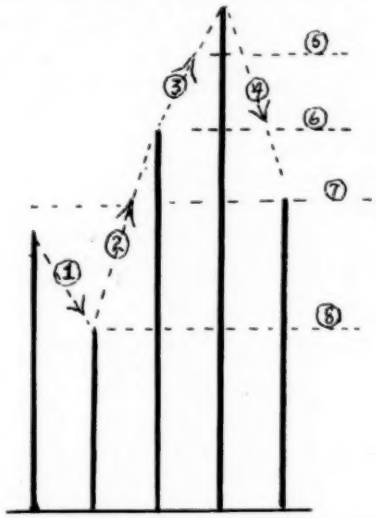

Chart 3.—Typical "expected" pattern for capillary resistance. *1.* Drop from February to April. *2.* Rise from April to July. *3.* Rise from July to August. *4.* Drop from August to November. *5.* August higher than all other periods. *6.* July higher than all but August. *7.* November higher than February. *8.* November higher than April; less or equal to July.

The results of this classification are shown in Table VI. It is evident that there is the same well-marked tendency for the individual graphs to follow the expected seasonal trend as was found for the means for the group. Nearly one-fourth of the 85 individuals (23 per cent) exhibit the typical pattern, 27 per cent have a decided correspondence to it, and 33 per cent have at least a few of its outstanding characteristics. Only 17 per cent have little or no indications of the seasonal trend though in most cases even these show at least the characteristic drop from February to April and/or from August to November. Though the agreement then is far from perfect, it seems obviously too high to be purely accidental.

TABLE VI

CLASSIFICATION OF CAPILLARY PRESSURES OF 85 CHILDREN FOR DEGREE OF CORRESPONDENCE TO TYPICAL SEASONAL PATTERN

SCORE FOR POINTS OF AGREEMENT	NO.	PER CENT	CLASSIFICATION	NO.	PER CENT
8 7	6 14	7 17	3 x, Typical pattern	20	23
6 5	6 15	9 18	2 x, Decided correspondence to pattern	21	27
4 3	9 19	11 22	x, Some correspondence to pattern	28	33
2 1 0	9 5 2	9 6 2	0, No correspondence to pattern	16	17

This conformity to pattern may be observed in Chart 4 in which are plotted the individual pressures for the 85 children on each of the five tests, grouped according to the classification described above (3 ×, 2 ×, × and 0). This chart can best be interpreted by remembering that to conform to the expected pattern all lines in the first period should show a drop (February to April), in the second a rise (April to July), in the third a further rise (July to August), and in the fourth a drop (August to November). It is evident from the chart and from summary Table VII that to a surprising degree the lines do follow these expected trends. For the group as a whole, two-thirds

TABLE VII

CONSISTENCY OF CHARTS FOR INDIVIDUAL PRESSURES WITH EXPECTED SEASONAL PATTERN, AS SHOWN ONLY BY DIRECTION OF LINES IN DIFFERENT PERIODS (PERIOD I, DOWN; II, UP; III, UP; IV, DOWN)

PERIOD AND DEGREE OF CONSISTENCY WITH EXPECTED PATTERN	ENTIRE GROUP		3 X		2 X		X		0	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
All cases	85	100	20	23	21	27	28	33	16	17
Total lines all periods	340		80		84		112		64	
Consistent in direction	226	67	72	90	66	79	68	71	20	31
Neutral	51	12	3	4	11	13	19	17	18	28
Inconsistent	73	21	5	6	7	8	25	22	26	41
Period I, Feb. to April										
Consistent (down)	49	58	13	65	12	57	17	60	7	44
Neutral (same)	13	15	2	10	5	24	2	8	4	25
Inconsistent (up)	23	27	5	25	4	19	9	32	5	31
Period II, April to July										
Consistent (up)	54	64	20	100	18	86	11	40	5	31
Neutral (same)	14	16	0	0	2	10	8	28	4	25
Inconsistent (down)	17	20	0	0	1	4	9	32	7	44
Period III, July and Aug.										
Consistent (up)	58	68	19	95	17	81	17	51	5	31
Neutral (same)	13	16	1	5	3	14	5	18	4	25
Inconsistent (down)	14	16	0	0	1	5	6	21	7	44
Period IV, Aug. to Nov.										
Consistent (down)	65	77	20	100	19	90	23	82	3	19
Neutral (same)	11	13	0	-	1	5	4	14	6	37
Inconsistent (up)	9	10	0	-	1	5	1	4	7	44

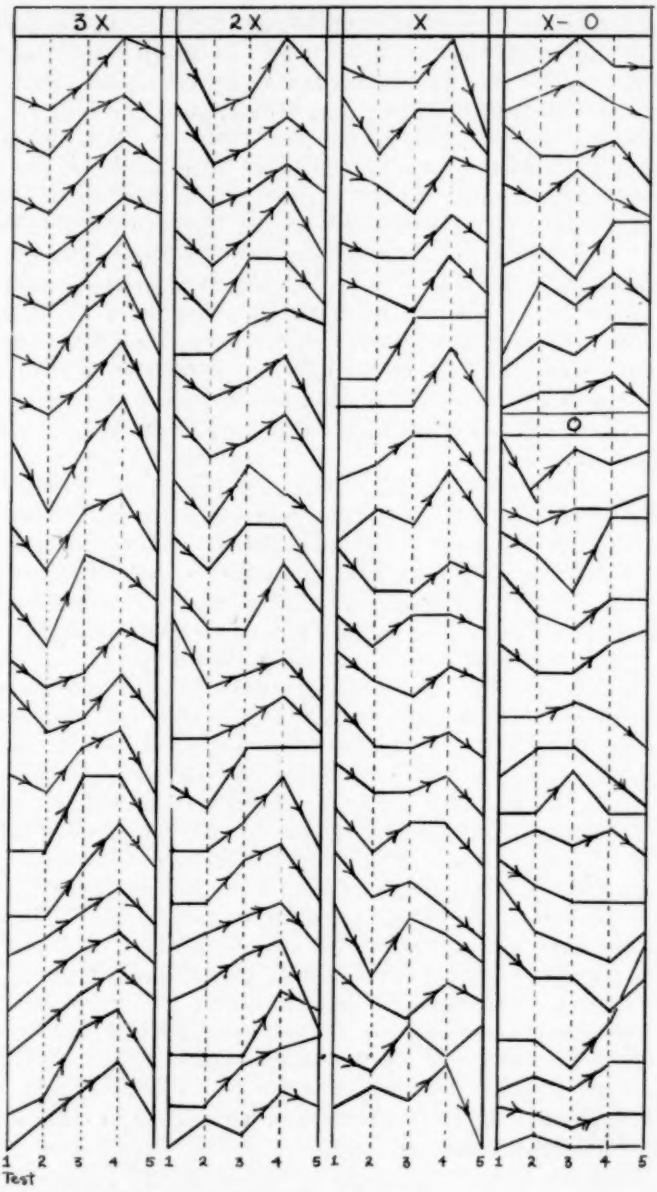

Chart 4.—Individual graphs for pressures of 85 children on five tests, arranged by degree of correspondence to typical seasonal pattern: *3x*, typical; *2x*, decided correspondence; *x*, some correspondence. Note the direction of the lines in each period, i.e., from 1 to 2, 2 to 3, 3 to 4, and 4 to 5. A typical pattern for the 4 periods would be: Down, up, up, down. For ease of interpretation all lines showing the expected trend are marked with an arrow. Note the high proportion in the *3x* group, and the decreasing number in the other groups.

of the lines for all periods (58, 64, 68, and 77 per cent for periods I to IV respectively) are consistently in the expected direction, another 11 to 14 per cent are neutral, that is, neither up nor down, and only 20 per cent of all lines—27, 20, 16, and 10 respectively for the four periods—are definitely inconsistent. The degree of agreement is obviously higher in the group designated 3 ×; namely, 65 per cent in group I, and 100, 95, and 100 per cent in the three other groups. It is somewhat less for groups 2 × and ×, though still high, being roughly 80 and 60 per cent for all periods in these respective groups. The agreement is, however, very low in group 0 where the chances are about even that a line will be in the expected or in the opposite direction. This method of tabulation, of course, ignores the consistency in the actual height of the different tests in relation to each other as used in the scoring system, and considers only whether a given test is higher or lower than a preceding one as might logically be expected.

By every method of analysis, then, there is evidence of a distinct seasonal trend in capillary resistance that appears too pronounced to be accidental. The mean pressures exhibit a characteristic seasonal trend, and 50 per cent of all individuals show a decided correspondence to it, with 28 per cent more having some of its most salient characteristics. When only the direction of the lines representing the height of the different tests is considered (February to April, down; April to July, up; July to August, up; August to November, down), two-thirds of the total 340 lines for all four tests are consistent in direction. It is not surprising that the agreement is not greater, even if one postulates for the moment a causal relation between resistance and antiscorbutic intake, for many unmeasured factors undoubtedly influenced the results. In the first place, as already pointed out, the vitamin C intake of individual children varied greatly even at the different periods, and there was no way of knowing which children might have failed to eat the vitamin C foods available, or when some may have chanced to have an orange or other fruit just preceding the test. Moreover, the lack of sensitiveness of the test, in which pressures were recorded in intervals of 5 cm. of mercury, may have obscured differences under this amount. For the present, then, it must be concluded that there appears to be at least a parallelism between the capillary resistance and the level of antiscorbutic. Before discussing its probable significance, the relation to other factors must also be examined.

Relation of Capillary Resistance to Infections.—As already pointed out, it is recognized by all workers that infection of various types may cause a decrease in capillary strength. Since a careful record had been kept of all illnesses and indispositions for the children of this study, these records were examined to determine what relation, if

any, might exist between these and the pressures found at the different seasons. The problem at once arose, as to how these data should be used. What illnesses, first of all, should be included? Should it be only infectious diseases such as measles and scarlet fever, or should it include colds, skin infections, and all other types? What, moreover, is the significant record; the number of children having infections, the number of infections, or the total days of illness from all causes? Since the answer to these questions was not forthcoming, the data were analyzed by every possible method to determine whether by any one of them a relation between resistance and infection or other illness could be shown (Table VIII).

As it turned out, the questions raised proved to be unimportant, for the results were practically the same whatever method of analysis was used. Since this was the case, discussion here will be based on the tabulation the writers believe to be most significant, namely, the total infections of all types plus immunizations. In Chart 1 these records are shown for each month of the year, together with the capillary resistance found in the five tests. It is obvious that if there is a relationship between infections and capillary resistance, it should be an inverse one. That is, when infections are at a peak, capillary resistance should be low, and when infections are almost nonexistent, resistance should be high. Examination of the chart shows that no such clear-cut relationship exists. The period of lowest resistance (April) is not the period of greatest infection; that period occurred in December and January preceding the first test. The curve for infections shows rather a definite downward trend from December through the rest of the year, with two small rises in April and in July. The first of these occurs, it is true, at the time when resistance is lowest, but the second occurs when resistance is nearing its peak. There does appear to be a relationship to the extent that when infections had almost disappeared in August capillary resistance was at its highest; but again, this apparent agreement is offset by the fact that the period of low infection continues into November when there is a sharp drop in capillary strength. The results, moreover, are similar when considered on the basis of total days illness or any other of the possible methods listed above. Although infection, therefore, may have played a rôle in determining the results, it is not clearly evidenced by the method of analysis here employed.

Capillary Resistance and Vitamin D.—It is obvious that there are many other factors varying coincidentally with season which should also be taken into consideration. One of these is the amount of sunshine or vitamin D. This is particularly pertinent in view of the article by Weld,[26] which appeared just as the present report was being completed for publication. This worker reports that capillary resistance is not related to vitamin C but rather to vitamin D, since

TABLE VIII

DISTRIBUTION NUMBER OF INFECTIONS, INOCULATIONS, AND DAYS ILLNESS THROUGHOUT THE YEAR

	DEC.	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.
Total infections and inoculations	68	42	38	12	21	8	5	20	2	1	2	21
Infections	50	31	21	12	21	7	5	22	2	1	2	3
Respiratory	39	16	10	12	18	3	2	4	2		1	3
Mumps	11	13	2									
Chickenpox			5									
Measles							1	14				
Skin and other		2	4		3	4	2	4		1	1	
Inoculations	18	11	17			1						18
Scarlet fever	18											
Diphtheria		11	17									12
Smallpox												6
Boils						1						
Total days illness from all causes	359	279	273	46	85	58	21	141	37	23	14	33

large intakes of orange juice did not alter the results of the capillary tests in his subjects, while vitamin D given either as viosterol or by irradiation caused a prompt and sustained rise in their resistance.

Examining the results of the present study in the light of Weld's findings, it is apparent that the seasonal variations in resistance herein described might well be explained on this basis, for the supply of vitamin D also parallels the capillary strength at the different seasons. The institution is located on a small farm on the edge of the city and the children are outdoors all of their available time at all seasons. They receive no cod liver oil or other added source of vitamin D, save for a small supplement for part of the group as noted below, and their chief supply of this vitamin is obtained from sunshine. It is obvious, then, that the trend of the curve of capillary resistance is about what would be expected if resistance were dependent on vitamin D. The one inconsistency is the sudden drop in resistance in November. Although the children were in school and their play outdoors more limited, a mile-and-a-half walk to school and play outdoors at noon, after school, on Saturdays, and on Sundays still gave them a fair number of hours of sunshine; and this, together with their abundant summer supply, should have lasted until the test was made the first week in November.

There is, fortunately, one other bit of evidence on this point. In connection with the other experiment previously mentioned, one-third of the children received daily an additional pint equivalent of irradiated evaporated milk, which supplied approximately 70 units of vitamin D. Another third had an equal amount of plain evaporated milk, and the remaining third were controls. When the article of Weld appeared, the records for the three dietary groups were reexamined to discover whether there was any difference observable in favor of the group having the additional vitamin D. The mean capillary resistance for each of the groups in each of the five tests is shown in Table IX.

TABLE IX

MEAN CAPILLARY RESISTANCE FOR THE FIVE TESTS BY DIETARY GROUPS (EXPRESSED AS SUM OF VALUES IN CM. OF PRESSURE FOR BOTH ARMS)

TEST	CONTROL	MILK	VITAMIN D MILK
	CM. HG	CM. HG	CM. HG
I, Feb. and March	40	38	38
II, April	35	33	32
III, July	41	42	39
IV, August	46	46	46
V, November	37	36	33

It is apparent that there is no difference in the trend for the groups. All show the typical seasonal pattern with no tendency for the vitamin D group to maintain any higher level of resistance than the other groups in the periods of low sunshine. This need not, of course,

mean that vitamin D is not effective, but merely that the amount supplied was not sufficient to produce any demonstrable results. It is still possible that the higher levels for all groups in July and August may be attributed to the abundance of sunshine at these periods.

DISCUSSION

It is apparent from the foregoing that the group studied manifested seasonal variations in capillary resistance. These variations showed no clear-cut relation to incidence of infections, but did show a distinct parallelism both to the dietary supply of vitamin C and to the sunshine available at the different seasons. The parallelism is indeed so striking in the case of vitamin C that one is tempted to infer that the relation is one of cause and effect. This cannot, however, be so concluded, for the relation is almost, if not quite, as pronounced for vitamin D; there are, moreover, other factors which may be involved. Variations in resistance as herein demonstrated cannot be attributed to any one factor until all others are controlled or ruled out. It may indeed be related not to a single one, but to a combination of several or all of these and other factors.

The assumption that the causal agent in capillary fragility is a deficiency of vitamin C is a logical one. The tendency to hemorrhage in scorbutic condition is well recognized, and it is reasonable to believe that a subclinical condition might be accompanied by reduced capillary resistance. Even though, as is well known, other factors also cause capillary fragility so that absolute standards of what is normal cannot be established, the test might, nevertheless, be useful in showing relative saturation or deficiencies in given individuals or groups. This is, indeed, all that Dalldorf, at least, has claimed for it. Before even this usefulness is accepted, however, the test must be shown to be valid; that is, it must be demonstrated that it actually is related to the body's stores of the vitamin. The survey of literature has revealed an impressive array of evidence that such is the case. The writers have located a total of 240 experiments on individuals carried out in 10 laboratories in which the effect of antiscorbutic on resistance has been tested. In 171 cases, or 71 per cent of the total, low resistance has been reported as restored to normal (109 cases) or improved (62 cases) on administration of antiscorbutic for varying periods. According to Schultzer failure of the others to respond indicates that the low resistance was due to other than dietary factors.

Arrayed against these results are the recent reports of carefully controlled laboratory experiments in which the body's store of vitamin C as indicated either by the level of blood ascorbic acid or by the urinary excretion has failed to show any relation to the results

of the test by either the positive or the negative pressure method. The impressive results obtained by Weld with vitamin D also open an entirely new field of investigation. Reexamined in the light of his work, it appears that even some of the positive results with vitamin C therapy might be explained almost equally well on his theory of vitamin D as the causative agent. In a surprising number of these studies the supplementation is found to have been made in May or June, a time when vitamin D is becoming more available in sunshine. The cases of seasonal incidence reported by Gedda and others might well be explained on this basis. Göthlin indeed mentions in the two cases of spontaneous recovery during the summer that the possible influence of vitamin D cannot be ignored. It is noted, likewise, in Dalldorf's report of 52 children that most of them received ultraviolet irradiation part of the time. And finally, in the present study, as has been seen, the results might also be interpreted as due to vitamin D, the chief arguments against it being the too sharp drop in resistance in the first part of November, and the failure of the group receiving 70 units of vitamin D a day in irradiated milk to show a more favorable trend than the ones not receiving it. The recent results of Schultz cannot, however, be attributed to vitamin D, since his study ended in May. His control group showed the same downward trend as the children in the present study, with but a slight rise in May, while the group given ascorbic acid showed rising resistance during the same period.

For the present, the writers are ready to conclude only that the seasonal difference in resistance appears to be too pronounced to be accidental; they hold no brief for any one explanation of the phenomenon. Because of results obtained in another study of 200 children, soon to be reported, in which a vitamin C supplement was given, they are not ready as yet to discredit entirely the theory of a relation between vitamin C and capillary fragility. They believe that the method should be further explored, the techniques refined, and probably other conditions of experimentation better controlled, before deciding that the method should be abandoned.

SUMMARY

The capillary resistance of a group of institution children was determined by the Dalldorf resistometer at five different periods during the year. The results were studied in relation to the dietary supply of vitamin C, the incidence of infections, and to the vitamin D available from sunshine at the different periods.

The capillary resistance as thus determined revealed a distinct seasonal trend. The mean pressure for the group was low in February, dropped still lower in April, rose somewhat in July, higher still in August, and dropped again to a lower level in November. The

records for many individual children exhibited the same trend; 83 per cent showed some tendency to follow the seasonal pattern; half of them revealed a decided correspondence, and 23 per cent almost a perfect one.

No clear-cut relation appeared between the capillary resistance and incidence of infection; but a striking parallelism was found between the pressures found and the level of vitamin C supply in the dietaries. An almost equal correspondence was noted between resistance and the amount of vitamin D available from sunshine at the different periods. It is emphasized that in neither case can the parallelism be interpreted as necessarily indicating a causal relationship.

It is believed that the seasonal variation in resistance herein observed is too pronounced to be accidental. Further studies carried out with more refined techniques and under controlled experimental conditions are necessary before the factor or factors responsible for the variations can be determined.

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THE TREATMENT OF ACUTE POLIOMYELITIS BY INTRAVENOUS INJECTION OF HYPOTONIC SALT SOLUTION

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THE rationale of the treatment of acute inflammatory disease of the central nervous system by the intravenous injection of hypotonic salt solution rests upon the following physiologic principle. The osmotic pressure of the blood stream is balanced at a level which may be represented by 0.85 per cent sodium chloride. Such a solution is called isotonic. Hypotonic salt solutions are those containing a lower per-

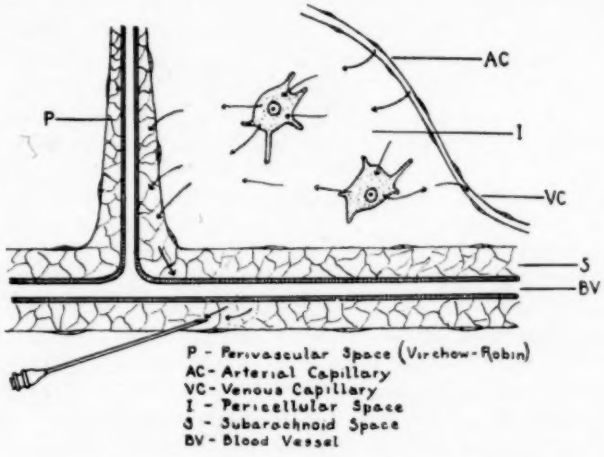

Fig. 1.

centage of salt. The intravenous injection of such a solution lowers the osmotic pressure of the blood stream, and there results a continuous egress of fluid from the capillaries into the perineural spaces in the depths of the tissues of the central nervous system. This fluid in turn causes an imbalance between the percentage of electrolyte within the nerve cell and the perineural space. There results a rapid interchange of fluid between the pericellular tissue fluid and the fluid within the cell. This fluid movement is maintained as long as the intravenous injection is continued.

The excess fluid is in part reabsorbed by the venous capillaries and in part drains down the Virchow-Robins perivascular spaces and is added to the lake of cerebrospinal fluid. While these fluid movements take place in all of the tissues of the body to some extent, the author has

shown that this fluid interchange is more selective to inflammatory tissue, as a result of the increased permeability of the capillary wall in these areas.[1]

Hypotonic salt solution has been used successfully in the treatment of acute poliomyelitis, acute encephalitis, Sydenham's chorea, and syphilis of the central nervous system. Future experience may also show that it may be of advantage as a vehicle for the introduction of sulfanilamide into the inflamed areas present in cases of streptococcus and meningococcus meningitis.

In this paper I will describe the clinical response obtained when this method was used in the treatment of 57 cases of acute poliomyelitis.

A treatment for acute poliomyelitis which can be used only in cases in the preparalytic stage of the disease requires statistical study for its evaluation. This was notably true of the convalescent serum treatment. The problem is somewhat different in relation to the evaluation of this method of treatment. Here we can actually see improvement in the clinical course of the bulbar and upper cervical paralyses while injections of hypotonic salt solutions are being administered. That we are favorably modifying the course of acute poliomyelitis therefore cannot be questioned.

PATHOLOGY

We are accustomed to think of the pathology of a disease, largely from changes observed in the tissues examined at autopsy. This is true of poliomyelitis where we have the added information obtained from the study of changes occurring in the monkey infected with the experimentally produced disease. In an effort to comprehend the various clinical improvements which have been observed in the treatment of this disease both in human beings and in monkeys during the time hypotonic salt solution is given, we must consider that the pathologic changes have not progressed to the degree observed in autopsied cases.

The lesions found in the central nervous system are essentially inflammatory, associated with degenerative changes in the neuron. These degenerative changes result from the direct action of the virus on the nerve cell and are compatible with the theory of neuron transmission of virus. The inflammatory reaction is diffuse and often affects wide areas of tissue. However, the virus of poliomyelitis is more selective to certain areas of the central nervous system, especially the gray matter and the anterior horn cells of the spinal cord. It particularly affects the cervical and lumbar sections of the cord as well as the medulla, and to some degree also the basal ganglia and the posterior nerve root ganglia. The inflammatory and degenerative processes vary greatly in intensity in different areas. In the inflamed areas are found hyperemia, edema with collections of fluid in varying amounts within the perineural spaces, other contiguous neurons showing varying degrees of inflammatory re-

actions, and others apparently unaffected. Still others may show degenerative changes. In the tissues there is found a cellular increase. These cells, as shown by Hurst[2] are mainly microglial cells which have undergone proliferative changes. A few lymphocytes are present, as well as polymorphonuclear leukocytes, the latter cells having probably passed through the capillary membranes by virtue of their power of locomotion. Changes in the Virchow-Robins perivascular spaces are of special interest in this discussion. These spaces are dilated, largely as a result of collections of fluid, and are infiltrated with an enormous number of cells. These cells are largely lymphocytes, often with an admixture of polymorphonuclear cells, and these cells form collars around the vessels and are contained within the limits of the Virchow-Robins spaces. At times, and more probably in the more severe cases, there is considerable increase in the percentage of polymorphonuclear leukocytes. The increased cellular content of the cerebrospinal fluid in cases of acute poliomyelitis is largely the result of the normal drainage of these cells from the perivascular infiltration. It must be remembered that there is a gradual egression of fluid from the Virchow-Robins spaces through the ostia and into the subarachnoid space, carrying with it a portion of these cells. Pleocytosis occurs very early in cases of acute poliomyelitis long before there is any clinical evidence of nerve irritation or nerve paralysis. From these findings in the cerebrospinal fluid we may infer that perivascular infiltration occurs very early in the disease. These changes in the perivascular spaces also vary greatly in degree in different areas of the central nervous system. They are most marked in the gray substance of the anterior horn cells in the more severely affected areas of the cord.

Collections of red blood cells have been described within the perivascular spaces, but Hurst believes this finding usually results from postmortem changes and does not occur during the active stage of the disease. Study of the cerebrospinal fluid during acute poliomyelitis would tend to substantiate this view.

Of further importance in this discussion is the presence of hyperemia in the inflamed tissues. This hyperemia results from the dilatation of capillaries and small veins, and this again varies in intensity in different areas. Wherever the inflammatory process is most intense there will be found the greatest hyperemia. These capillary walls are more permeable to fluid interchange, and their permeability increases in proportion to the inflammatory process of which they are a part. I have been able to show that when a hypotonic salt solution is injected intravenously, the passage of water through capillary membranes is more selective to inflamed areas, and probably increases also in ratio to the acuteness of the inflammatory process.[1]

The sequence of these inflammatory processes is of importance in relation to this treatment, particularly the sequence of inflammatory reac-

tion and neuronphagia. Although we recognize the futility of any attempt to regenerate a nerve cell after it has been destroyed, I believe that our evidence tends to substantiate the theory that the severity of the inflammatory reaction in the central nervous system can be reduced by the proper use of hypotonic salt solutions. In this connection it must be remembered that the pathologic processes in the monkey with poliomyelitis, while conforming to the same general behavior as in human beings, are far more intense and far more rapid in their course. Experimentally produced poliomyelitis in the monkey therefore, is not to be compared, at least in severity, with the pathologic changes which would be present in the human case during the early febrile period. Hurst[2] has demonstrated that neuronphagia may precede inflammatory reaction in experimentally produced poliomyelitis. However, from the clinical behavior of the early acute case in the human being, we would expect this not to be of importance, otherwise evidence of paralysis would occur earlier in the course of the disease than is the fact. From a clinical viewpoint the first change observed predictive of possible destruction of the nerve cell, is an increased reflex which results from an irritation of the neuron. Later if the process progresses we may have loss of reflex, followed by muscular weakness and, later, paralysis of the muscle from the destruction of the nerve cell itself.

PROGNOSIS

In the individual case the prognosis of acute preparalytic poliomyelitis, as to the development of paralysis, extent of such paralysis, and death is not possible. Experience has shown that there are several factors which may be present during the early preparalytic phase of the disease and which may signify an unfavorable outcome. However, experience has also shown that there are exceptions, and we often cannot be assured as to the future outcome of the individual case.

While the mortality rate depends to a degree upon how carefully the nonparalytic cases are studied, i.e., whether careful physical and laboratory examinations are made, still the death rate in epidemics ranges from 5 to 40 per cent. The death rate is higher within the first year of life; is lower between the first and tenth years, and gradually increases after the tenth year with increase in age. With very rare exceptions, death occurs only in the paralyzed cases, and usually results from complete paralysis of the muscles of respiration or from pneumonia following partial paralysis. Cases developing paralysis of deglutition have a death rate of about 50 per cent. Cases of ascending paralysis (Landry's type) are universally fatal, death ensuing as a result of respiratory paralysis. Observers who have studied a considerable number of cases of acute poliomyelitis have often seen cases, beginning mildly, and later developing a rapid and fatal course.

The evaluation therefore of a therapeutic procedure in the preparalytic stage, must rest upon a statistical study. The evaluation of treat-

ment used in cases of bulbar and upper cervical paralysis is less difficult. In the early preparalytic stage of the disease, prostration, high cell count in the cerebrospinal fluid, and a high percentage of polymorphonuclear leukocytes in the cerebrospinal fluid are factors which usually are significant of a severe course of the disease.

The following description covers a study of 57 cases of acute poliomyelitis treated by the injection of hypotonic salt solution, during the summer of 1935. The reader must remember that these cases represent the first group so treated, and that during this time the author was endeavoring to learn the value of hypotonic solutions in the treatment of this disease. I was also concerned with the evaluation of procedure in relation to the clinical response of acute cases, and while results of this study were gratifying, certain factors which are vital to success were not entirely appreciated. I therefore believe that better results can be obtained in the future. Many of these cases were not given sufficient treatment, and often there were too long intervals allowed between treatments. This latter failing was not intentional but was due to lack of sufficient personnel to care for all of these patients at the time individual treatments were indicated.

In general the following plan was adopted. The physical examinations and diagnoses were made by the visiting physicians and the interne staffs of the hospitals, and the results were checked by them. The less severe preparalytic cases were not treated unless they showed signs of active progress of the disease. This policy is not advised for I would not wish to imply that this treatment should be reserved only for the more severe cases. The selection of cases of preparalytic poliomyelitis for treatment was made after attention had been given to the temperature, cerebrospinal fluid examination, presence of prostration, examination of muscular power and examination of reflexes. Preparalytic cases which had a reasonable chance of recovery without paralysis were not treated but were checked carefully as to their progress. When significant changes were noted they were added to the treatment group. Cases of actual paralysis which still showed progress as evidenced by pleocytosis, were treated. No case was refused treatment because of its severity. All cases treated are mentioned in this group. There were no deaths among the 57 cases treated.

These patients were treated in Binghamton, N. Y., in Louisville, Ky., and in Syracuse, N. Y. I am indebted to Dr. George Lape of Binghamton, and Dr. Hugh Leavell of Louisville, Ky., for their interest and cooperation in this work. An initial, B., L., or S. is placed before the name of each case to identify it.

These cases are analyzed in groups. Only the salient features are mentioned.

Case L. 13. K. J. was the only one in the group who did not appear to be seriously ill, but was treated at the insistence of the mother. Case L. 3. H. H. was apparently a case of bulbar involvement. He was pro-

TABLE I

INFLUENCE OF TREATMENT BY INTRAVENOUS HYPOTONIC SALT SOLUTION IN A GROUP OF CASES OF ACUTE POLIOMYELITIS

NAME	AGE, YEARS	ONSET, DAYS	CELL COUNT	LYMPH. PER CENT	POLY. PER CENT	SEVERITY	RESULT
L. 1. O.G.	4	1	264	18	82	Prostrated, markedly ill.	Knee jerk returned. Complete recovery.
L. 2. M.M.	3½	1	79	34	66	Prostrated, tremor.	Complete recovery.
L. 3. H.H.	23	2	147	60	40	Prostrated, photophobia, nystagmus, muscle soreness, tenth nerve. Pulse 96-50.	Complete recovery.
L. 4. G.S.	3	1	63	48	52	Not acutely ill, left knee jerk sluggish.	Knee jerk normal. Complete recovery.
L. 5. F.A.	10	7	183	48	52	Very ill, nervous irritability, tremor, difficulty standing.	Complete recovery.
L. 6. P.W.	7	2	333	27	73	Prostration, muscle pain.	Complete recovery.
L. 7. T.W.	13	1	38	93	7	Prostration.	Complete recovery.
L. 8. G.S.	26	3	55	87	13	Not prostrated, hyperactive biceps.	Complete recovery.
L. 9. F.M.	14	1	87	98	2	Biceps, triceps, right increased.	Biceps, triceps reflexes gone. Complete recovery.
L. 10. P.M.	12	7	65	78	22	Not prostrated, hyperactive reflexes.	Reflexes normal. Complete recovery.
L. 11. M.M.	25	4	149	61	39	Acutely ill, arm reflexes hyperactive, arm muscles weak.	Muscles strong. Complete recovery.
L. 12. E.L.	4	1	63	92	8	Leg muscles weak, unable to stand.	Immediately following treatment, muscles strong, walks about in crib.
L. 13. K.J.	14	1	44	89	11	No prostration.	Complete recovery.
B. 14. R.W.	18	4	75	20	80	Not prostrated, knee jerk lost. 80 per cent polys.	Complete recovery.
B. 15. J.D.	18	1	82	98	2	Not acutely ill, reflexes normal.	Complete recovery.
B. 16. A.G.	13	4	130	98	2	Not prostrated, nystagmus, leg pain, left arm and leg muscles weak.	Complete recovery.
L. 17. M.C.	11	4	42	98	2	Not prostrated, left deltoid weak, left biceps, triceps reflexes absent.	Left arm strong. Complete recovery.
B. 18. S.S.	3½	2	50	100	0	Not prostrated, very drowsy, could not hold arm against its own weight, arm reflexes gone.	Arm strong following treatment. Complete recovery.
B. 19. M.G.	11	4	103	99	1	Not severe, abdominal muscles out, no muscle weakness.	Abdominal reflexes return. Complete recovery.
S. 20. A.B.	12	4	148	92	8	Not prostrated, nystagmus, biceps, triceps, abdominal reflexes out.	All reflexes return except right biceps. Complete recovery.

foundly prostrated and the pulse rate suddenly slowed from 96 to 50, thought to be caused by irritation of the tenth nerve. Three of the cases (5, 12, and 16), with weakness of the leg muscles, unable to stand before treatment, were able to walk immediately after treatment. In the entire group treated there were but three preparalytic cases which developed paralysis. These cases will be discussed under a separate grouping. There was one other preparalytic case in which paralysis developed not included for the reason that the treatments ordered were not given and long periods of time were allowed to elapse between the individual treatments. The method cannot be effective under such circumstances.

PREPARALYTIC CASES WHICH DEVELOPED PARALYSIS

In this group attention is directed to the all-important interval between treatments, which was not properly regulated. Experience has shown both in human beings and in monkeys that this interval of time is paramount. While I am not in a position to know the fate of these patients had they been treated according to our present method, I do know that the time interval between treatments, if too greatly prolonged, allows gradual extension of the paralytic process, and that in 153 separate treatments, in only one has definite extension been noted during the actual treatment period. Until cases of this kind are managed correctly, prognosis as to the amount of damage that may be prevented cannot be given. It would seem from a study of this material that, in cases of ascending paralysis serious damage cannot be entirely prevented, although I believe that the death of these cases can be averted since their paralyzed respiratory muscles do respond to this type of therapy.

The upper section of Table II includes data pertinent to these cases. The lower sections show the patients' weight, number of hours the treatment was given, the number of hours between treatments, and the amount of intravenous hypotonic solution (0.375 per cent NaCl) given in each treatment. Since the treatment of these cases, the author has found that it is vital to the success of the method to give five-hour treatments in acute poliomyelitis with a four-hour rest period between the first and second and a six-hour rest period between the second and third. The operator must be guided by the clinical behavior of the patient as to the amount and frequency of further treatment.

L. Case 1. P. P.—Before treatment muscle weakness was noted in the legs. During the first treatment he developed partial paralysis in the legs. Between the first and second treatments the paralysis in the legs was progressive and became complete. The paralytic process also included the bladder and the respiratory muscles. The abdominal reflexes were lost. There developed some weakness of the arms. Between the second and third treatments there was further extension of the paralysis of the arms. During and following the third treatment improvement was noted in the function of the respiratory muscles; bladder still incontinent; some returned function of the extensor muscles of the right leg.

TABLE II

PLACE	NAME	SEX	AGE	DURATION	TEMP.	CELLS	DIFFERENTIAL PERCENTAGES		
							LYMPH.	POLY.	MONO.
L.	1. P.P.	M	18	1 day	100.2	107	38	60	2
L.	2. J.P.	M	8	2 days	100.0	109	94	16	0
L.	3. K.N.	M	2	24 hours	100.0	243	58	38	4
1. P.P. Weight 150 lb.									
Treatment No.				1	2	3	4	5	6
Hr. of treatment				3	5	3	3½	3	4
Interval hr.				21	6	8¼	6	9	
Intravenous solution				4,325 c.c.	5,125	4,675	4,575	3,060	3,500
2. J.P. Weight 65 lb.									
Treatment No.				1	2	3	4	5	
Hr. of treatment				3	4¾	3¾	2¾	2¾	
Interval hr.				19	12	24	5 days		
Intravenous solution				1,975 c.c.	2,170	2,051	1,620	1,650	
3. K.N. Weight 25 lb.									
Treatment No.				1	2	3	4	5	6
Hr. of treatment				4¼	4½	4¼	4¾	3¼	4½
Interval hr.				14	7½	6¼	10½	8¾	
Intravenous solution				1,700 c.c.	1,625	2,300	2,300	1,700	1,475

L. 2. J. P.—The patient seemed acutely ill with the usual signs of acute poliomyelitis, including marked tremor of the hands. Following the first treatment the tremor was entirely gone. He was generally improved, with less prostration. Between the first and second treatments (19 hours) muscle weakness was noted in the right forearm and right deltoid. Following the second treatment he regained normal strength of the right forearm and right deltoid. Between the second and third treatments (24 hours) no change was noted, muscular function was good. No further treatment was given for a period of five days when the patient was found to have a paralysis of the left deltoid and weakness of the left triceps. A fourth treatment was given, following which the triceps was definitely stronger and there was some evidence of partial function of the left deltoid. The condition of this patient following the third treatment was so satisfactory that no further treatment was given until five days later when the paralysis of the deltoid was first discovered. Demands on the time of our personnel during the epidemic were so great that progress of this kind was overlooked. More treatment should have been given earlier.

L. 3. K. N.—This patient appeared to be a very severe preparalytic case. He improved until the interval between the fourth and fifth treatments (10½ hours) during which he developed weakness of the left deltoid which was found to be improved following the fifth treatment. In the interval between the fifth and sixth treatments (8¾ hours) he developed paralysis of the left deltoid. The cell count at this time was still well above normal, 187 cells; temperature was normal. This case was not managed according to our present ideas, particularly in relation to the intervals between treatments. Fourteen hours elapsed between the first and second treatments. Cases which show an increased cell count, as did this one, after several treatments have been given, should still be vigorously treated.

RESPIRATORY PARALYSIS CASES

Following is a brief discussion of 10 cases of respiratory paralysis treated.

L. C. W.—Girl, aged seven years. Two days' illness. Cell count 180, lymphocytes 16 per cent, polymorphonuclears 84 per cent. Temperature 102. Severely ill, convulsions, delirium, coma, sixth nerve paralysis. Between the second and

third treatments (12 hours) the right intercostals and right diaphragm were completely paralyzed. Movement of the respiratory muscles was checked one hour after the beginning of the third treatment, diaphragm and intercostals were found active but not to the extent of the normal left side. Following the fourth treatment the right intercostals and diaphragm were completely recovered.

L. B. K.—Girl, age nine years. Four days' illness; cell count 264, lymphocytes 56 per cent, polymorphonuclears 44 per cent, temperature 104. Severely ill, prostrated, delirious, marked tenderness on pressure of all muscles, intercostals paralyzed bilaterally. Seven treatments were given. Between treatments there was some extension of paralysis of the arms. During treatments there was improvement of some of the paralysis, especially the muscles of respiration. Following treatment there was complete recovery of respiratory function. The left deltoid was paralyzed.

L. P. P.—Male, age eighteen years. One day's illness. Cell count 107, lymphocytes 40 per cent, polymorphonuclears 60 per cent. Temperature 100.2. Rapidly fulminating Landry's type. Involvement of the diaphragm and intercostals bilaterally. With each treatment there was progressive improvement in the respiratory function. During the first treatment there was extension of paralysis and following the first treatment (21 hours) further extension. Treatment did not prevent progress of paralysis of arms and legs but did improve respiratory paralysis.

L. E. W.—Girl, age fourteen years. Four days' illness. Cell count 27, lymphocytes, 93 per cent, polymorphonuclears 7 per cent. Temperature 100.8. Ascending, Landry's type, very severe. Both right and left diaphragms and intercostals were affected. Two treatments were given. There was improvement in the respiratory muscles. Respiratory rate decreased from 36 to 28 during treatment. The patient stated that during and after each treatment her breathing was less labored. Further treatment was not given because of hemolysis of red blood cells. Later she was placed in a respirator.

L. D. L.—Male, aged seven years. Four days' illness. Cell count 190, lymphocytes, 84 per cent, polymorphonuclears 16 per cent. Temperature 98.9. Ascending type. Legs were completely paralyzed for twenty-four hours; there was weakness of the arms; abdominal reflexes were out. Two treatments were given. The interval between treatments was seven and one-half hours. There was improvement in breathing. A few hours following the second treatment breathing became labored and he was placed in a respirator. This case was badly managed, partly due to conditions beyond my control. The respirations improved during treatment and I believe, had he been properly managed, the respirator would not have been necessary.

I am convinced from the response of patients with respiratory paralysis, that the use of the respirator will become unnecessary, particularly when the treatment is begun early and proper attention is given to the various factors essential to success. In cases of respiratory paralysis the therapeutic response is most convincing. Here we can actually see the improvement in respiratory excursions and these improvements are often observed within a short time from the beginning of the intravenous injection. Improvement can also be noted by counting the respiratory rate and I have often had patients remark that their breathing was less labored.

B. A. G.—Male, aged eleven years. Seven days' illness. Cell count 234, lymphocytes, 91 per cent, polymorphonuclears 9 per cent. Temperature 104.4. Ascending Landry's type. Legs and bladder were paralyzed for thirty-six

hours. Abdominal reflexes were out, right diaphragm was very weak, right intercostals paralyzed, left diaphragm weak. Respirations improved during treatment. Following the second treatment he could urinate voluntarily. Between the fourth and fifth treatments (24 hours) respirations became labored. There was no apparent movement of either diaphragm or intercostals. He was breathing with a tug of the sternomastoid muscles, cyanosed, stupor, extremities cold and clammy. Slight chest movement was observed ten minutes after the fifth treatment began. In one-half hour the blankets could be seen moving with respirations. Following treatment both diaphragms were active and there was some intercostal movement. There was partial residual paralysis in both arms and legs.

B. R. N.—Male, age fifteen years. Five days' illness, cell count 88, lymphocytes 60 per cent, polymorphonuclears 40 per cent. Temperature 104. The patient entered the hospital at 4:00 P.M. Between 4:00 P.M. and 9:00 P.M. the following changes took place. He lost left biceps, triceps, and right triceps reflexes, lost left and right ankle and knee jerks. At 8:30 the tongue protruded to the left. At times there were sudden jerks of the muscles of the arm, and occasional jerks of the right diaphragm. He was very restless. The intercostal muscles were paralyzed. Treatment was begun at 9:00 P.M. Three treatments were given. The interval between the first and second was seven and one-half hours, between the second and third, seven hours. Following the first treatment there was no deviation of the tongue. Following the third treatment the biceps and triceps reflexes were normal, bilaterally, abdominals, normal. Intercostal muscles were active. There was no deviation of the tongue. The respiratory rate was reduced from 32 to 18. Between treatments there was noted slight progression in various paralytic signs. With each treatment there was improvement in these signs. The patient made a complete recovery.

S. M. E.—Girl, age twelve years. Three days' illness. Cell count 155, lymphocytes 60 per cent, polymorphonuclears 40 per cent. Temperature 103. There was decreased movement in the diaphragm on both sides, more marked on the left. For the past few hours she had had increasing difficulty in breathing. During the course of the first treatment her breathing definitely improved. During and following the two subsequent treatments there was still further improvement in respirations. Following the third treatment respirations were normal in character.

Discussion.—It is evident from a review of the above cases that paralysis of the diaphragm and intercostal muscles yields readily to this treatment. In this group are included six cases of the ascending Landry's type. These cases have a very high mortality rate, death resulting from respiratory paralysis. Unfortunately the paralysis of muscles controlling the arms and legs is not influenced as readily, although I am convinced that still better results can be obtained when five-hour treatments are given and when proper rest periods are used.

In the case of L. E.W., I dropped the percentage of salt solution to 0.2 per cent because of her desperate situation and produced a marked hemolysis of red blood cells. This is the only experience I have had with a solution of this strength and I would strongly advise against its use. As a result of the hemolysis I did not have the courage to continue treatment, although the patient had shown marked improvement during and following the two treatments given. She was sent to the respirator where she recovered, but I believe that the respirator would have been unnecessary had further treatment been given.

PARALYSIS OF DEGLUTITION

S. M. E.—Girl, age twelve years. Three days' illness. Cell count 155, lymphocytes 60 per cent, polymorphonuclears 40 per cent. Temperature 101.8. She had been unable to swallow liquids for a period of three days. Following the first treatment she could swallow liquids for a six-hour period, when she lost the ability to swallow. Following the second treatment she was again able to swallow liquids for a period of seven hours. Following the third treatment she again regained the ability to swallow liquids and three days later was eating solid food. There was complete recovery of the throat.

S. M. F.—Girl, age ten years. Twelve hours' illness. Cell count 94, lymphocytes 77 per cent, polymorphonuclears 23 per cent. Temperature 100. She had been unable to swallow for twelve hours. Following the first treatment she could drink fluids slowly without passing them back through the nose. Following the second treatment there was still greater improvement in swallowing. Following the third treatment her throat had completely recovered and she ate solid food.

L. C. W.—Girl, aged seven years. Two days' illness. Cell count 180, lymphocytes 16 per cent, polymorphonuclears 84 per cent. She was acutely ill with convulsions and delirium. Between the first and second treatments she developed paralysis of the throat (a period of 19 hours and 35 minutes). All fluids were regurgitated through the nose. Following the second treatment she was able to drink fluids normally. Following the sixth treatment she ate solid food.

B. A. T.—Male age eight years. Four days' illness. Cell count 39, lymphocytes 79 per cent, polymorphonuclears 21 per cent. He was severely ill, with convulsions; was regurgitating fluids through the nose. Between the second and third treatments he could take small sips of water and swallow it with difficulty. Following the third treatment he was able to swallow freely.

B. R. S.—Male, age three and one-half years. Two days' illness. Three treatments were given. Between the first and second treatments (14 hours) he developed inability to swallow fluids, regurgitating through the nose. Immediately following treatment he drank a glass of orange juice. There was no return of the throat paralysis. He made a complete recovery.

The mortality in ninth nerve paralysis cases is high (50 per cent). Death is usually due to pneumonia resulting from aspiration of mucus and food particles from the throat. Untreated cases which recover, regain the function of the throat in an average of seventeen days' time. In all ninth nerve paralysis cases we have observed the same prompt improvement noted in the respiratory cases treated. Here also the paralysis will return if future treatment is delayed. All of these cases recovered.

The following is a case of paralysis of the muscles of deglutition. It is presented in detail as it illustrates the proper management of a case of acute poliomyelitis. In reviewing the case attention is called to the various factors which will be discussed, i.e., the rate of injection of the hypotonic salt solution, the duration of the treatment period and the intervals between treatments.

S. M. F.—Girl, age ten years. Entered the hospital Oct. 7, 1935. On October 3 her mother thought she was developing a cold as she complained of frontal headache and malaise. Her temperature was 99.8° F. On October 3 and 4 she was in bed

part of the time. On October 6 she became very drowsy, developed a nasal twang in her voice and was unable to swallow solid food. Her temperature was 101° F. During the night of October 6 she was delirious at intervals. On October 7 she was lethargic throughout the day, could be aroused but would not answer questions except to shake her head. She swallowed teaspoonfuls of fluid with great difficulty and at 2:00 P.M. was unable to swallow at all. At 6:00 P.M. her father brought her a new doll. She paid no attention to it although she is very fond of dolls. (Three days later, when asked about the doll, she did not remember anything about it.) At 9:00 P.M. she was sent to the Syracuse Memorial Hospital by Dr. Scobey. She was examined at 10:00 P.M. and the first treatment was begun at 12:00 midnight. She was irrational.

Physical Examination.—Patient was lying quietly, apparently asleep. She could be aroused but would go back to sleep while being examined. She did not seem to understand what was asked of her. Pupils were equal, reacted to light promptly with alternating constriction and dilatation (hippus). There was marked nystagmus of both eyes when rotated to the right and to the left. Rigidity of the neck was found on extreme flexion and a 3 plus back sign. Brudzenski's sign was present. Her voice had a nasal twang and lacked force. The tongue was protruded in the midline and soft palate movements were normal. Reflexes: Right biceps, 1 plus; left biceps, 2 plus. Both triceps absent. Knee jerks and ankle jerks present and equal on the two sides. Abdominal reflexes present on the right, absent on the left. Muscle function tests were difficult due to the dull mental state and extreme prostration of the patient. After repeated efforts she seemed to show strength in biceps, right triceps weaker, left triceps definitely weak; leg muscles seemed stronger; extensors of the left thigh seemed weak.

During the interval between the examination and the beginning of treatment there were noted a few violent contractions of the diaphragm.

During the progress of the first treatment the patient became less drowsy and answered questions in a strong voice lacking the nasal twang.

Interval between the first and second treatments was four hours. Temperature 99° F.

In the half hour preceding the second treatment the patient again became drowsy, dull and listless, with slight cyanosis. She did not swallow quite as well but did not regurgitate through the nose. Cell count was 40 cells, of which 39 were lymphocytes and one a polymorphonuclear leukocyte. She was given a five-hour treatment, injecting an average of 800 c.c. per hour of 0.375 per cent NaCl. Her temperature at the beginning of the treatment was 99° F., at the close, 98.6° F. The cell count at the end of the treatment was 16 cells, all of which were lymphocytes.

Following the second treatment she could drink with ease. She was mentally clear and alert; voice strong. She presented a marked contrast to her condition on entrance. There was no cyanosis.

Between the second and third treatments, an interval of six hours, she remained mentally clear and alert and was able to swallow liquids. She lost her lower abdominal reflexes and became incontinent of urine. Her temperature remained 99° F. Cell count was 16 cells, all lymphocytes. Off count 91 cells, 90 lymphocytes, and 1 polymorphonuclear cell.

A third treatment was given, of five hours' duration with 0.375 per cent NaCl, at the average rate of 700 c.c. per hour.

During the third treatment she again became continent. Following the third treatment she was alert, swallowed liquids and ate solid food. All reflexes were present including triceps and abdominals. Her bladder was continent. She wanted to play and to read and said that she felt well and wanted to go home.

TABLE III

FIRST TREATMENT

Name, M. F. Age, ten years. Weight, 67 lb. Solution, 0.375 per cent NaCl. Date, Oct. 8, 1935. Temperature, 100° F. Pulse, 120. Respirations, 24. 1:45 A.M. Cell count 94 cells, lymphocytes 55, large lymphocytes 6, monocytes 16, polymorphonuclears 23.

HOURS A.M.	INTRAVENOUS SOLUTION AMOUNT C.C.	CEREBROSPINAL FLUID AMOUNT C.C.	PULSE	RESPIRATION	NURSE'S OBSERVATIONS
1:45	started		128	24	At beginning of treatment, face
2:15	350	7	120	20	flushed. Voice weak. Listless.
2:45	400	12	116	20	Breathing labored. Drowsy.
3:15	400	12	120	20	Unable to void.
3:45	400	10	120	20	Voice stronger. Respiration easier.
4:15	350	9	120	20	Face less flushed. Involuntary
4:45	400	12	120	20	urination. Sleeping.
5:15	400	8	120	20	Voided 300 c.c. Coughs occa-
5:45	400	9	120	20	sionally.
6:15	400	10	116	20	Slept well. Voided 350 c.c.
6:45	400	10	120	20	Needles removed.
5 hr.	3,900	99			

Off count: 23 cells, small lymphocytes 20, polymorphonuclears 3.

The interval between the third and fourth treatments was nine hours. During this time the patient remained alert; spoke with a strong voice; swallowed well with an occasional slight regurgitation of fluid through the nose, but later ate semisolids and swallowed them well. Again the urine became incontinent and the lower abdominal reflexes gave questionable response. Other reflexes were normal. Cell count was 61 cells, 91 per cent lymphocytes, 4 per cent monocytes, 5 per cent polymorphonuclear cells.

A fourth treatment was given using the same solution at the average rate of 800 c.c. per hour for five hours. The patient slept throughout the treatment, without sedatives. Off count was 11 cells, all lymphocytes.

On October 10 her condition was excellent. She was alert, swallowed liquids well and swallowed solids readily. There was no nystagmus. Reflexes were all present; bladder continent. No treatment was given.

On October 11 the patient was mentally clear and alert, swallowed solids well, could not speak quite as plainly as she had. There was a slight nystagmus to the left. The right lower abdominal reflexes were not present; bladder incontinent. Temperature 99.6° F. Cell count 59 cells, all lymphocytes.

A fifth treatment was given for a period of five hours, the intravenous injection being given at the average rate of 700 c.c. an hour, and the solution used, 0.375 per cent NaCl. During the treatment she regained control of her bladder. Off count was 14 cells, of which 13 were lymphocytes and one a monocyte.

Following this treatment she continued to be alert; swallowed well; reflexes were all present except the right triceps and the right lower abdominals. No further signs of disease progress developed and the patient was dismissed from the hospital on October 17, normal in every way.

Mortality figures for this group range from 38 per cent to 50 per cent. The recovered cases regain their ability to swallow fluids on an average of seventeen days. Death usually occurs from aspiration pneumonia.

TABLE IV

SUMMARY OF CASE S. M. F.

Treatment No.	1	2	3	4	5
Hr. duration	5	5	5	5	5
Hr. interval	4	6	9	2 days	
Total NaCl	3,900 c.c.	3,600	2,350	4,000	3,390

From a review of these 6 cases it would seem that ninth nerve paralysis responds fully as well to this treatment as do the cases of respiratory paralysis. This response is compatible with the pathologic findings in cases of bulbar paralysis, where nerve destruction is a rare event.

CASES SHOWING VARIOUS DEGREES OF PARALYSIS OF THE MUSCLES OF THE EXTREMITIES

In this group are included cases of paralysis of the muscles of the extremities, present before the treatment was instituted. These patients were treated largely with the hope of preventing further progress of the paralytic process. In each instance the disease was still in the "active" stage and thought to be progressive.

Included in this group are a number of patients without paralysis, but with muscular weakness. These cases are also "active" as was shown by the temperature, by the changes in the cerebrospinal fluid, and by the duration of the illness. Of course we all see patients with acute poliomyelitis who develop muscular weakness and who do not progress to complete muscular paralysis. Such cases usually regain their muscle power very slowly, often after a period of several weeks. The changes observed in the group shown here are changes observed either immediately following treatment, or a few hours thereafter. They would seem therefore to oppugn the behavior which might be expected were the case not so treated. Complete paralysis of the muscles of the extremities will not improve. This lost function is due to actual destruction of the nerve cells within the cord. Examination of spinal cords taken from cases of acute poliomyelitis has repeatedly shown extensive cell destruction, while a lack of such cell destruction is a notable feature of similar examinations of the midbrain and the medulla.

B. R. G.—Male, age thirteen years. Duration four days. Extensors and flexors of the left foot weak. Left knee jerk and ankle jerk absent. Temperature 100° F. Pulse 96. Respirations 22. Cell count 33 cells, all lymphocytes. *Result:* Return of strength to extensors and flexors of the left foot. Left knee jerk and ankle jerk returned. Complete recovery.

B. F. M. A.—Male, aged eleven years. Duration four days. Weakness of the left shoulder girdle. Biceps, triceps, tendon reflexes absent on the left. Temperature 101° F. Pulse 90. Respirations 22. Cell count 42 cells, 98 per cent lymphocytes, 2 per cent polymorphonuclears. *Result:* Complete recovery of strength of left shoulder. Biceps reflex present, triceps reflex absent. Complete recovery.

L. C. H.—Male, age seven years. Duration three days. Could extend foot of right leg weakly. Unable to do so against any resistance. Temperature 101° F.

Pulse 104. Respirations 26. Cell count 109 cells, 82 per cent lymphocytes, 2 per cent large lymphocytes, 16 per cent polymorphonuclears. *Result:* Immediately following treatment, leg muscles definitely stronger. Complete recovery. Walks normally, with endurance.

L. J. P.—Male, age eight years. Duration two days. History of headache, sore throat, and vomiting, pain in the back. Tremor of forearms and hands. Weakness of right forearm and right deltoid. Temperature 102° F. Pulse 120. Respirations 24. Three treatments were given. After the first treatment the tremor was no longer present. After the third treatment he recovered the strength of his deltoid. Three days were allowed to elapse without treatment, during which time he had a normal temperature. At the end of the third day of rest his deltoid was found to be paralyzed. Another treatment was given with some improvement in the function of the deltoid. *Result:* Partial deltoid paralysis.

L. V. J.—Female, age six years. Duration four days. Headache, vomiting; flaccid paralysis of the right leg for two days. Temperature 100.6° F. Pulse 104. Respirations 26. Cell count 68 cells, lymphocytes 92 per cent, large lymphocytes 7 per cent, polymorphonuclears 1 per cent. *Result:* No change in flaccid paralysis after treatment.

L. W. M.—Colored male, age sixteen years. Duration seven days. Unable to use left arm. Motion in left leg impaired. Moderate rigidity of the neck with painful flexion. Muscles of the left shoulder girdle and left arm tender to pressure. Marked weakness in muscles of shoulder girdle and in flexors and extensors of arm. These muscles moved weakly against resistance. The muscles of the lower left extremity were also tender on pressure. Weakness of flexors of the thigh. Temperature 98.8° F. Pulse 88. Respirations 22. Cell count 4 cells, all lymphocytes. *Result:* Following treatment return of strength to all muscle groups and flexors of the thigh. Complete recovery.

L. F. M.—Male, age twenty-five years. Duration four days. Had continued headache and pain in the back, progressively worse. The day before he had complained of weakness of the arms. Appeared acutely ill, anxious expression, movements of the eyeballs unsteady, marked nystagmus when rotated both right and left. Movements of all muscles present, flexors and extensors of the arm moved weakly against resistance. All reflexes hyperactive. Moderate stiffness of the back and neck. Temperature 101° F. Pulse 120. Respirations 24. Cell count 77 cells, lymphocytes 51 per cent, large lymphocytes 6 per cent, mononuclears 4 per cent, polymorphonuclears 39 per cent. *Result:* Immediately following treatment the muscles had completely regained strength, movements of the eyes steady, no nystagmus.

B. R. S.—Male, age three years. Duration two days. Complained of pain in the neck and back. Drowsiness. Left arm, pectoral group and deltoid very weak. Cannot hold arm against its own weight. Triceps and biceps reflexes absent. Temperature 100° F. Pulse 120. Respirations 28. Cell count 50 cells, all lymphocytes. *Result:* Immediately following treatment could hold heavy objects up in his right hand. Biceps reflexes returned. Triceps reflexes not returned. Recovery complete.

L. A. W.—Colored male, age fifteen years. Duration three days. History of headache with pain in back of neck and stiffness of neck. Flaccid paralysis of left arm including extensors and flexors of forearm. Weakness of muscles of shoulder girdle. Weakness of extensors of right leg. Temperature 100.2° F. Pulse 116. Respirations 20. Cell count 107 cells, 11 per cent lymphocytes, 26 per cent large lymphocytes, 5 per cent mononuclears, 58 per cent polymorphonuclears. Three treatments were given. *Result:* The extensors of the right leg were strong. Flaccid paralysis of the arm unchanged. No further extension of paralysis.

L. J. S.—Male, age two years. Duration four days. Left arm flaccid for a period of twenty-four hours. Right leg showed muscular weakness unable to stand

without support. Temperature 101° F. Pulse 120. Respirations 28. Cell count 137 cells, 59 per cent lymphocytes, 19 per cent large lymphocytes, 22 per cent polymorphonuclears. *Result:* Complete recovery of strength in leg. Arm paralysis unchanged.

L. M. R.—Female, age thirteen years. Duration seven days. Paralysis of right arm and forearm, including right shoulder girdle, for a period of forty-eight hours. Weakness of both legs, more particularly the right. Could not stand without falling. Temperature 99.2° F. Pulse 104. Respirations 28. Cell count 98 cells, 85 per cent lymphocytes, 15 per cent polymorphonuclears. *Result:* Following the second treatment, showed some motion of the fingers of the right hand, right upper extremities otherwise unchanged. Able to walk and could extend and flex right leg against strong resistance.

PROCEDURE

A lumbar puncture is made, with the removal of a small amount of cerebrospinal fluid for laboratory examination, not over 7 c.c. Puncture

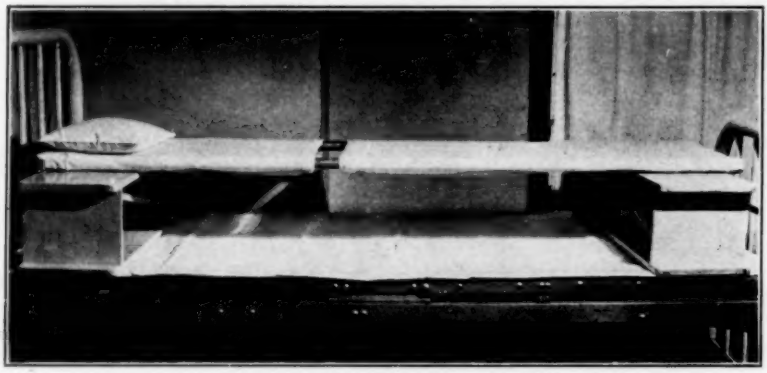

Fig. 2.—Complete arrangement of bed for perivascular drainage treatment.

is done on a Bradford frame. The stylette is replaced in the lumbar needle with the needle protruding through the window in the frame.

An intravenous injection of hypotonic salt solution is given. The best solution for routine use is 0.375 per cent NaCl, as this solution does not produce hemolysis of red blood cells. Intravenous injection must be given over a period of five hours.

The interval between the first and second treatments must not exceed four hours; between the second and third treatments, six hours. The intervals between subsequent treatments may be increased, depending upon the severity of the case. Indications for further treatment are cell count, temperature, and any change in the reflex picture.

The cell count at the end of any treatment cannot be depended upon for purposes of prognosis. Twelve hours after the completion of the third treatment, lumbar puncture must be made and if the cell count is above 20, and if polymorphonuclear cells are present, further treatment

must be given at once. As many as six or seven treatments are often necessary. Normal temperatures cannot be depended upon in determining the need for further treatment.

The rate of the intravenous injection is 10 c.c. per pound of body weight each hour (22 c.c. per kilo each hour) for three hours, and a slightly slower rate for the subsequent two hours is often advisable.

At half-hour intervals the nurse in charge of the case should remove the stylette from the needle and allow 5 c.c. of cerebrospinal fluid to drain—if the fluid flows from the needle in a stream. If it flows in a rapid drop she is to remove 2 c.c. If in a slow drop she is to replace the stylette without draining any fluid. It has been shown that the drainage of cerebrospinal fluid is not related to the therapeutic result. These small amounts of cerebrospinal fluid are removed to prevent possible increase in intracranial pressure.

At half-hour intervals the nurse should also record the pulse rate and the respiratory rate.

Patients may be given food during the course of the treatment.

Untoward Symptoms.—Headaches should not develop during a properly conducted treatment. They are usually caused by a lowered intracranial pressure from the drainage of too much cerebrospinal fluid. Chills result from improperly prepared rubber tubing. Pure gum rubber tubing is preferred. Chills may also result from improperly prepared solutions.

Contraindications.—Since the interchange of fluid is more selective to inflamed areas, the central nervous system will be deprived of benefit and a diversion of fluid will result, if the following circumstances prevail.

1. Existence of a block causing obstruction to the circulation of cerebrospinal fluid.

2. Presence of inflammation of the lungs or bronchi, for in these cases an edema of the lungs will immediately follow the introduction of the hypotonic salt solution.

3. Presence of acute nephritis or cardiac weakness. Such a case was encountered in Binghamton in a girl who had voluntarily starved herself for a period of two months and had lost 70 pounds. The treatment was attempted but she immediately developed an edema of the lungs, as a result of her weakened heart muscle, and the intravenous injection could not be given.

4. In cases of pyuria there will be a copious excretion of urine interfering with the therapeutic fluid movements in the central nervous system.

5. In cases where colitis exists, quantities of fluid will be excreted from the bowel.

SUMMARY

In conclusion, our evidence shows that acute poliomyelitis can be favorably influenced by this treatment. This statement is based upon the following experience: First, 10 cases of respiratory paralysis have been treated, all of which recovered. Improvement in respiratory function is both objective and subjective, and occurs during the actual treatment period. One of the respiratory cases showed complete paralysis of both diaphragms and intercostals before treatment. In the past all cases showing this much paralysis have been fatal. The behavior of this group I believe shows that the use of the respirator will become unnecessary in the future management of this type of paralysis. Second, 6 cases of paralysis of deglutition have all recovered promptly. All cases so treated have been able to drink fluids following the first treatment, an event which cannot be explained on a basis of coincidence, as paralysis of the throat does not thus improve in untreated cases. Third, both of the above groups carry a mortality rate of around 50 per cent, and while this group is scarcely large enough for statistical evaluation, it included 16 cases with recovery in each instance. The preparalytic group included in this report were all cases in which the disease was sufficiently severe that paralysis might be a reasonable expectancy. I have 7 other cases in my records of preparalytic cases, not included here since they were apparently milder in their course, and their recovery would not add any significance to this group. Fourth, I am confident that this treatment will not in every instance prevent the development of paralysis. This is particularly true in the ascending (Landry's) type. In these cases the progress of the paralytic process is rapid and the case fulminating in nature. Resistance of the patient, for some reason not known, is definitely less than in the usual type. However, the respiratory paralysis from which the Landry's type dies, does yield to the treatment and it is therefore possible to save these patients' lives. More vigorous treatment is indicated in this group than I have used in the past. Fifth, weakness of the muscles of the extremities, without actual paralysis, has promptly improved and I have often seen reflexes return following treatment, which have not responded to stimuli before treatment was given. Sixth, actual paralysis of the muscles of the extremities does not improve. However, treatment of this group is advised if the case is "active," with the hope of preventing further loss of function. Seventh, finally, we have been able to prevent paralysis and death in Rhesus monkeys which have been infected with many times the lethal dose of virus; all of our control animals having died after complete skeletal paralysis.

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A CASE OF ENDEMIC TYPHUS FEVER (BRILL'S DISEASE) IN A THREE-AND-ONE-HALF-YEAR-OLD CHILD

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DURING the twenty years (1916 to 1936) in which endemic typhus fever has been a reportable disease in Connecticut, there have been 12 cases reported to the Connecticut State Board of Health[1] (Table I). Several of these have been personally investigated by Dr. Millard Knowlton, Director of the Bureau of Preventable Diseases, who noted the consistency of the clinical pictures of this disease with the diagnoses. Most of them have been confirmed by the Felix-Weil agglutination test in high dilutions.

TABLE I

YEAR	SEX	AGE	YEAR	SEX	AGE
1921	Unknown	Unknown	1930	Male	41
1923	Unknown	30-34	1931	Female	36
1927	Male	57	1931	Male	57
1927	Male	34	1932	Male	60
1928	Male	60	1936	Male	22
1929	Female	40	1936	Male	54

In looking up the records on this rather uncommon disease, we were struck by the fact that there were no cases reported in Connecticut in children.[2] The youngest case on record was in a young adult twenty-two years of age, which was reported in 1936. We have been fortunate in having had the opportunity to observe a rather typical example of this disease in a youngster of three and one-half years of age. Because this is the first case of endemic typhus fever in a child in Connecticut to be reported and because, as noted, the diagnosis is rarely made we feel that this case should be placed on record.

CASE REPORT

F. V., a white boy, aged three and one-half years. He walked at one year and talked precociously. At about one and one-half years of age he had a mild attack of lobar pneumonia. About a year later he had a severe attack of trench mouth. From then on he seemed perfectly well until Feb. 1, 1937.

At this time he complained of headache, general pains, weakness, and sore throat. According to his mother he was very fretful and wanted to stay in bed, which was very unusual for him. On Feb. 2, 1937, his mother noticed that he seemed to have a high fever; his face was flushed; he cried continuously and he vomited his breakfast. He was seen by one of us (S. DeR) on February 3. The child at this time complained of headache and dizziness, vomited continuously, and looked acutely ill. The temperature was 104° F.; the pulse, 140; and there was a flushed face. The tonsils were enlarged, fiery red, but with no exudate, and the cervical lymph nodes were enlarged. Although he complained of earache, a normal looking drum and canal made us consider that the ear was not involved. The symptoms continued except that the mother noted that the temperature was diminished

in the morning only to rise at night. On February 5, because of continuous pain in the right ear and stiffness of the neck in spite of a normal looking drum, an ear consultation was arranged. He was seen by Dr. Sherburne Campbell who pronounced the ears uninvolved. At this time the opinion of the physician was acute pharyngitis and tonsillitis. The earache and stiff neck were explained by the cervical adenitis and concomitant myositis.

On February 7, the child had a marked rigor lasting approximately twenty minutes. Following this the temperature rose to 105° F. There was a definite area of dullness in the left base and bronchial breathing was present over this area. The diagnosis of lobar pneumonia was therefore made clinically. At this time my coauthor, Dr. Caplan, was called in consultation. He agreed in the diagnosis, and noted a very distended abdomen. During the next three days the child did not improve. There was a slight cyanosis of the lips and he was admitted to the Meriden Hospital.

On admission to the hospital on February 10, he was acutely ill, with cyanosis of the lips and fingernails. There was a deep flush over the left malar bone. His respiration rate was fifty with a temperature of 104° F. and pulse of 140. There were still the classical signs of consolidation in the lower left lung. The abdomen was still distended. There was no rash on the body. The white blood count at this time was 37,000 with 97 per cent polymorphonuclears.

One-half hour after admission a fine petechial rash was noted on the abdomen and chest. This rash became macular and later maculopapular and extended to the back, both legs, and elbows. At no time was there any rash on the face. This exanthem lasted about two days and during the following day pigmented areas were noted. The temperature fluctuated between 103° and 106° F. for three days.

On the fourth hospital day the temperature suddenly dropped to 98° and the child seemed much improved. Although the signs were still present in his chest and there were many subcrepitant râles over the area involved, we felt that the crisis had been passed. The temperature stayed down, however, only one day and then began to have a daily fluctuation from 100° to 105° or 106°. This continued for approximately nine days. During the time that the temperature was normal, the child seemed fine, talking to the nurses and physicians, and playing with toys. However, at the times when the temperature was elevated, as for example to 106°, he seemed severely ill with a pulse which could not be counted accurately and a respiration of 70.

Although the signs in the chest were clearing and no clinical diagnosis of empyema could be made, a roentgenogram was taken. The plate was read by Dr. F. N. Otis as showing definite clearing of a left lower lobar pneumonia with no sign of empyema. Subsequent roentgenograms confirmed the previous diagnosis. Blood cultures were negative. The white blood count was definitely falling, coming down from 37,000 on admission to 8,000 at the time of the highest fever (106.6° F.) and there was a corresponding fall in polymorphonuclear cells from 97 to 69 per cent. The urine was consistently negative except for an occasional slight tract of albumin. On February 25, the Felix-Weil test was positive up to a dilution of 1 to 640. This was repeated on March 5, showing an increased agglutination. The slide test for typhus recently developed by Dr. Henry Welch was reported "very suggestive."

The temperature began to fall by lysis after about thirteen days of hyperpyrexia. During this time there was no specific treatment except for intramuscular liver (in a futile attempt to raise the white blood count) and two blood transfusions. The blood was given because of the danger of failing circulation when the fever was at its height. The child then went on to an uneventful recovery except that the abdomen remained distended and it was necessary to give him cathartics daily before the bowels would move. Although no barium enema was given and the diagnosis was therefore made clinically, there was probably a Hirschsprung's disease present also.

TABLE II

LABORATORY EXAMINATIONS

DATE	RED BLOOD CELLS	HEMOGLOBIN PER CENT	WHITE BLOOD CELLS	POLYMORPHONUCLEARS, PER CENT	LYMPHOCYTES PER CENT	MONOCYTES, PER CENT
2/11/37	4,120,000	80	37,000	97	4	0
2/16/37	3,860,000	70	27,000	89	11	
2/18/37	4,000,000	76	11,000	76	18	6
2/20/37			8,000	74	21	5
2/21/37	3,620,000	75	9,100	76	22	2
2/23/37	3,940,000	75	8,000	82	17	1
2/25/37			13,600	74	23	3
2/27/37	3,840,000	75	9,100	76	22	2
3/ 1/37	3,520,000	75	11,400	69	31	0

TABLE III

FELIX-WEIL AGGLUTINATION TESTS

DILUTIONS	20	40	80	160	320	640
February 25	3+	4+	4+	4+	3+	1+
March 3	2+	4+	4+	3+	3+	1+

We believe that this child's illness began with an acute pharyngitis and tonsillitis. He then developed a lower left lobar pneumonia. Simultaneously, or within a few days, he also developed typhus fever and, peculiarly, the typical rash appeared three days before the crisis of the pneumonia.

Repeated close questioning of the family did not divulge any history of louse infestation. As far as they knew there was no history of any bite of any kind. They did think there might be rats or mice in or near their home.

COMMENT

Endemic typhus has been frequently described in medical literature.[3-19] After an incubation period of approximately two weeks, the disease begins with chills, fever, malaise, prostration, and general aching. On about the fourth or fifth day, the rash which is so typical starts on the chest or abdomen. It is described as macular, being red to purple, and may spread to the arms and legs, but never involves the face.[14-20] Some authors have described the rash as maculopapular[20] while others have called it petechial.[17] The fever which accompanies the disease ranges from 102° to 106° F., with daily remissions, and after a period which seldom varies from exactly two weeks, falls by lysis. A prominent feature is the tendency to neurologic symptoms such as stiff neck, delirium, or drowsiness. At times there is a troublesome cough; sometimes there are nausea, constipation, and abdominal pain. Less than half the cases show a splenomegaly[20] which, when present, is usually slight and transient.

The diagnosis can often be made from the symptoms, though in atypical cases, the Felix-Weil agglutination test is of great aid. This

test depends on the fact that certain strains of *B. proteus* are agglutinated by the sera of individuals infected with this disease. It is generally understood that this is a nonspecific reaction; that is, that these strains of *B. proteus* are definitely not the organisms which cause this disease. Different strains, however, cause different amounts of agglutination and hence in the performance of the test as many different strains should be used as are available, in the hope that the patient's serum will agglutinate one of them in high dilution.[21] It has been shown recently that sera from individuals recently vaccinated against typhoid or from individuals suffering from various febrile states including the paratyphoid fevers and the dysenteries will often agglutinate *B. proteus*,[23, 24] but usually the agglutination is not in higher than one to 160 dilution. Agglutination in 1 to 320 or 1 to 640 dilution should be respected. An increase in the amount of agglutination after six days is considered almost pathognomonic of typhus fever.[21] Dr. Henry Welch of the Connecticut State Department of Health has recently developed a slide test for this disease which has very high accuracy and is almost fool-proof.[21]

There is one other method of diagnosis which is absolute and can be used when there is still doubt. This consists in the inoculation of two or more cubic centimeters of the patient's blood intraperitoneally into guinea pigs. Approximately six days later the pig's temperature will suddenly rise to about 106° and the typical pathologic lesions[17] will be seen in the animal's testicles. Occasionally there are lesions in the brain[26] and spleen.[17] The testicular lesions consist of marked edema and redness.[25] There is exudate covering the testicles with hemorrhages at the poles. Smears from the tunica vaginalis or the spleen may show rickettsiae.[27]

The mortality of endemic typhus is usually low.[11, 12, 14] Among the thirteen cases which occurred in this state there was one death.[2] Since the number of cases is such a small one, no statistical value can be placed on the cases in Connecticut, but numerous investigators have placed it at less than four per cent. Although the disease is rare in colored individuals[22] (for example, less than one-tenth of one per cent in a large series of cases in Alabama) the mortality in colored persons is three or four times as high.[18] The complications described have been for the most part limited to bronchopneumonia, thromboses, and suppurative parotitis.[20]

Most investigators feel at this time that endemic typhus is not carried by lice.[12, 17, 19] Many arguments have been offered to substantiate this view and they seem well founded. Very few cases have been reported in unclean or untidy persons. Very few if any have occurred in jails. The incidence in negroes even in the far south has been very slight. Careful examination of the clothes of proved cases has shown no lice. There have been no bites found on proved cases nor have there been scratch marks or other signs on the skin. There are now

several investigators who have proved to their own satisfaction that rats and mice after being infected may be bitten by fleas or mites[12, 17, 19, 28] which in turn may infect people whom they bite. The scratching after the bite tends to put the infectious material deposited by the flea in the wound and thus infect the individual.[29, 30]

SUMMARY

The first case of endemic typhus fever occurring in a Connecticut child is reported. A three and one-half-year-old white boy developed an attack of acute tonsillitis and pharyngitis followed by lobar pneumonia, and simultaneously developed a rather typical case of typhus. The Felix-Weil agglutination test and the new slide test confirmed the diagnosis.

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THE MANTOUX TEST

A Statistical, Clinical, and Roentgenologic Survey of 6,155 Infants and Children Over a Period of Nine Years

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FOR a number of years it has been a routine procedure to perform the intracutaneous test of Mantoux on all infants and children admitted to the New York Foundling Hospital. They are received from various sources, namely, the Department of Public Welfare, the city courts, various charitable organizations, and the police department (foundlings). Naturally, their homes are in the lower economic strata.

The following races and nationalities are included in this survey: Irish, Italian, Polish, Greek, Puerto Rican, Spanish, German, Hebrew, Bohemian, English, and Negro.

The technique of the test is as follows: One-tenth cubic centimeter of a 1:1000 dilution of old tuberculin in physiologic saline solution is injected intracutaneously into the anterior surface of the forearm. Three inches from the site of this injection one-tenth cubic centimeter of a 1:1000 dilution of control broth material in physiologic saline solution is injected intracutaneously. At the end of forty-eight hours the results are recorded. The material used is that which is supplied by the Bureau of Laboratories of the Department of Health of New York City.

During the nine-year period from 1928 to 1937, 6,155 infants and children from birth to seven years of age received the Mantoux test (Table I). This table shows that 291 or 4.7 per cent reacted positively and also that with the advance in age, the percentage of positive reactors

Table I

Incidence of Positive Reactors to Old Tuberculin

AGE	NUMBER TESTED	NUMBER POSITIVE	PER CENT POSITIVE
0 to 6 mo.	1,765	13	0.7
6 to 12 mo.	658	21	3.1
1 to 2 yr.	1,481	50	3.3
2 to 3 yr.	872	65	7.4
3 to 4 yr.	603	46	7.6
4 to 5 yr.	394	41	10.3
5 to 6 yr.	239	32	13.3
6 to 7 yr.	143	23	16.0
Total	6,155	291	4.7

From the service of Dr. John Giblin, New York Foundling Hospital.

to old tuberculin increased accordingly. This confirms the observations of previous investigators.[1-6] It is of interest to mention that of the thirteen positive reactors in the first age group (0-6 mo.), one was 18 days old.

Table II shows the classification according to sex. This table records a predominance of males over females, corresponding to the findings of previous investigators.[1-3]

TABLE II

INCIDENCE OF MALES AND FEMALES

AGE	MALES TESTED	FEMALES TESTED	TOTAL
0 to 6 mo.	964 54.6 per cent	801 45.4 per cent	1,765
6 to 12 mo.	344 52.2 per cent	314 47.8 per cent	658
1 to 2 yr.	802 53.4 per cent	679 46.6 per cent	1,481
2 to 3 yr.	498 57.1 per cent	374 42.9 per cent	872
3 to 4 yr.	331 54.8 per cent	272 45.2 per cent	603
4 to 5 yr.	215 54.5 per cent	179 45.5 per cent	394
5 to 6 yr.	135 56.4 per cent	104 43.6 per cent	239
6 to 7 yr.	84 59.4 per cent	59 40.6 per cent	143
Total	3,373 54.7 per cent	2,782 45.3 per cent	6,155

Table III indicates a predominance of male reactors over female reactors, in the proportion of four to three, except in the age group six to twelve months, which shows a predominance of males over females in the proportion of two to one.

TABLE III

INCIDENCE OF POSITIVE REACTORS ACCORDING TO SEX

AGE	MALES POSITIVE	FEMALES POSITIVE	TOTAL
0 to 6 mo.	7 53.8 per cent	6 46.2 per cent	13
6 to 12 mo.	14 66.6 per cent	7 33.4 per cent	21
1 to 2 yr.	32 64.0 per cent	18 36.0 per cent	50
2 to 3 yr.	31 47.6 per cent	34 52.4 per cent	65
3 to 4 yr.	24 52.1 per cent	22 47.9 per cent	46
4 to 5 yr.	23 56.0 per cent	18 44.0 per cent	41
5 to 6 yr.	16 50.0 per cent	16 50.0 per cent	32
6 to 7 yr.	16 69.5 per cent	7 30.5 per cent	23
Total	163 56.0 per cent	128 44.0 per cent	291

Upon examining Table IV, we find that no definite conclusions may be drawn because of the great disproportion between the number of negro children and white children. Incidentally, it is of interest to note that the number of positive colored reactors was 16.1 per cent of all the positive reactors in this survey.

TABLE IV

INCIDENCE OF POSITIVE REACTORS TO OLD TUBERCULIN ACCORDING TO RACE

AGE	WHITE		NEGRO	
	NUMBER TESTED	POSITIVE REACTORS	NUMBER TESTED	POSITIVE REACTORS
0 to 6 mo.	1,649	9 0.5 per cent	116	4 3.4 per cent
6 to 12 mo.	619	20 3.2 per cent	39	1 2.5 per cent
1 to 2 yr.	1,338	40 2.9 per cent	143	10 6.9 per cent
2 to 3 yr.	796	59 7.4 per cent	76	6 7.8 per cent
3 to 4 yr.	546	39 7.1 per cent	57	7 12.2 per cent
4 to 5 yr.	363	35 9.6 per cent	31	6 19.3 per cent
5 to 6 yr.	216	23 10.6 per cent	23	9 39.1 per cent
6 to 7 yr.	131	19 14.5 per cent	12	4 33.3 per cent
Total	5,658	244 4.3 per cent	497	47 9.4 per cent

Histories were obtainable on 265 of the 291 positive reactors (91.0 per cent). Seventy-five (28.4 per cent) gave a definite history of exposure to active tuberculosis prior to admission to the hospital (Table V). The

TABLE V

FAMILY AND SOCIAL HISTORIES OBTAINED FOR 265 POSITIVE REACTORS

A. Incidence of Contact With Tuberculosis	
Positive reactors exposed to tuberculosis	75—28.4 per cent
Positive reactors with no known history of exposure to tuberculosis	190—71.6 per cent
B. Incidence of Tuberculosis at Home	
Mothers with tuberculosis	67—89.3 per cent
Fathers with tuberculosis	8—10.7 per cent

source of the infection among these seventy-five patients upon whom histories were obtained was confined entirely to the parents of the children, no other member of the household being involved. The mother was the active case in nine out of ten instances.

Fourteen (5.2 per cent) of the 265 positive reactors developed clinical tuberculosis as shown in Table VI. Nine deaths occurred among the 265 positive reactors. Eight of these died as a result of tuberculous infection. The clinical diagnoses were confirmed by autopsy in four cases. One died of a nontuberculous infection (Tables VII, VIII).

TABLE VI

INCIDENCE OF CLINICAL TUBERCULOSIS AMONG 265 POSITIVE REACTORS

Miliary tuberculosis	3
Tuberculous meningitis	2
Adult type pulmonary tuberculosis	4
Phlyctenular conjunctivitis	3
Tuberculosis of spine	1
Tuberculous osteomyelitis (metatarsal bone)	1
Total	14
Per cent	5.2

TABLE VII

DEATHS AMONG 265 POSITIVE REACTORS

Miliary tuberculosis	3
Tuberculous meningitis	2
Adult type pulmonary tuberculosis	3
Nontuberculous lobar pneumonia	1
Total	9
Per cent	3.3

TABLE VIII

TUBERCULOUS DEATHS AMONG 265 POSITIVE REACTORS

NAME	EXPOSURE TO TUBERCULOSIS	DATE OF POSITIVE MANTOUX REACTION	DATE OF DEATH	INTERVAL BETWEEN POSITIVE REACTION AND DEATH	AGE AT DEATH	TYPE OF TUBERCULOSIS
B. C.	No	5/24/33	5/29/33	5 days	3 yr.	Tuberculous meningitis
E. A.	Yes	1/18/32	12/ 1/33	1 yr. 10 mo. 12 days	7 yr.	Tuberculous meningitis
P. F.	Yes	1/ 4/34	1/14/34	10 days	8 mo.	Miliary tuberculosis
E. D.	Yes	2/ 9/32	7/19/32	5 mo. 10 days	14 mo.	Adult pulmonary tuberculosis
R. S.	Yes	8/11/33	12/26/33	4 mo. 15 days	4 yr.	Adult pulmonary tuberculosis
W. L.	No	10/20/32	11/ 5/33	1 yr. 15 days	15 mo.	Adult pulmonary tuberculosis
I. N.	Yes	12/ 2/31	2/27/32	2 mo. 25 days	8 mo.	Miliary tuberculosis
M. M.	Yes	7/25/35	12/21/35	4 mo. 26 days	3 yr.	Miliary tuberculosis

Tables IX and X show the incidence of positive roentgenologic findings among the positive reactors and a classification of these findings.

TABLE IX

ROENTGENOLOGIC SURVEY OF 291 POSITIVE REACTORS

Positive reactors with positive roentgenologic findings	230—88.4 per cent
Positive reactors with negative roentgenologic findings	30—11.6 per cent
	260
Positive reactors (no x-ray report)	31
Total	291

TABLE X

CLASSIFICATION OF ROENTGENOLOGIC FINDINGS OF POSITIVE REACTORS

Bronchopulmonary adenopathy	147—63.9 per cent
Bronchopulmonary adenopathy with parenchymatous involvement	54—23.4 per cent
Tuberculous pneumonia	29—12.6 per cent
Total	230

In a discussion of this classification it is necessary to mention that the term bronchopulmonary adenopathy included all those cases in which there was enlargement of the hilar lymph glands. By the term tuberculous pneumonia, we mean a parenchymatous pneumonic process with or without enlargement of the hilar lymph glands.

In Table XI an attempt has been made to compare the results of this survey with those of other investigators, all of whom employed the Mantoux test. In making a comparison of this kind, it is difficult to arrive at definite conclusions due to the variation in the number, type, and economic status of the cases studied. Each investigator has noted the increase in the number of positive reactors with the corresponding increase in age. It may be mentioned that the total percentage of positive reactors among our cases is definitely lower than that indicated in previous surveys (Table XI). This difference may be attributed to the following three factors: the Mantoux test was performed as a routine admission procedure on a group of children in whom the presence of tuberculous infection was not suspected; the incidence of colored children in this group was comparatively small; these children were under strict medical supervision throughout the period of this study.

SUMMARY

1. The Mantoux test was performed on 6,155 children in the New York Foundling Hospital from 1928 to 1937.

2. There were 3,373 males (54.7 per cent) and 2,272 females (45.3 per cent).

3. The number of positive reactors was 291, representing 4.7 per cent of the total number investigated.

4. There were 497 negro children (8.0 per cent) and 5,658 white children (92.0 per cent).

5. Seventy-five (28.4 per cent) of 265 positive reactors gave a definite history of exposure to tuberculosis. (Histories were unobtainable on the remaining 26 cases.)

6. The mother was the proved source of infection in 89.3 per cent of the patients.

7. Fourteen positive reactors (5.2 per cent) developed clinical tuberculosis.

TABLE XI

COMPARATIVE SURVEY OF POSITIVE REACTORS IN LARGE CITIES

AGE	NEW YORK 1928 TO 1937 SCHEUER AND KAREL		NEW YORK 1930 TO 1932 DROLET		NEW YORK 1921 TO 1928 SMITH		ROCHESTER 1926 TO 1934 BEAVEN		CHICAGO 1930 TO 1931 WEBB		SAN FRANCISCO 1925 TO 1928 DICKEY AND SEITZ		DETROIT 1929 JOHNSTON AND CHADWICK	
	T*	%†	T	%	T	%	T	%	T	%	T	%	T	%
0 to 6 mo.	1,765	0.7	1,102	1.9	1,425	3.38	928	1.6	28	3.5	0	0	168	1.7
6 to 12 mo.	658	3.1	687	8.0	982	8.0								
1 to 2 yr.	1,481	3.3	787	9.0	1,088	12.5	571	1.6	63	7.9	179	5.6	146	7.5
2 to 3 yr.	872	7.4	598	14.4	704	14.7	430	6.9	51	5.8	213	13.6	147	4.0
3 to 4 yr.	603	7.6	443	15.6	402	15.6	368	9.2	78	9.0	243	16.9	157	7.0
4 to 5 yr.	394	10.3	362	18.8	421	16.1	345	8.1	68	8.8	328	19.8	146	14.3
5 to 6 yr.	239	13.3	305	15.7	396	21.2	310	10.0	92	13.0	311	20.6	165	13.3
6 to 7 yr.	143	16.0	331	16.6	425	24.4	330	9.4	90	10.0	340	16.5	182	12.6
Total 0 to 1 yr.	2,423	1.4	1,789	4.3	2,407	5.2	928	1.6	28	3.5	0	0	168	1.7
Total 0 to 7 yr.	6,155	4.7	4,615	10.2	5,843	11.3	3,282	5.3	470	9.1	1,614	16.4	1,111	8.8

*T—Number tested.

†%—Percentage of positive reactors.

8. Eight of these fourteen (57.1 per cent) died of tuberculous infection.

9. There were nine deaths (3.3 per cent) among the positive reactors.

10. The youngest case noted with a positive Mantoux reaction was 18 days old.

Miss Eleanor P. Kirwan, statistician at the New York Foundling Hospital, gave invaluable assistance in this study.

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CENTRAL NERVOUS SYSTEM DISEASES IN THE COURSE OF SCARLET FEVER

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A REVIEW[1] has recently been presented regarding the nature and frequency of scarlet fever streptococcus meningitis as a complication in scarlet fever. In our experience, this is the most common condition related to the meninges encountered, but by no means the only one. There were twenty such cases.

KINDS OF MENINGEAL REACTION IN SCARLET FEVER

Distinction is made between causes of meningeal irritation extraneous to scarlet fever, such as tetany and the cerebral manifestations of nephritis, and those attributable to the acute infection. Clinical evidence, the characteristics of the cerebrospinal fluid, and autopsy determinations serve in differentiation.

With a restatement of terms in keeping with present-day usage, the types of meningeal reaction distinguished by Benard[2] still serve as an acceptable classification. Such distinctions are at best arbitrary. In spite of improved diagnostic methods the precise recognition of a cerebral reaction early in the course of scarlet fever is often difficult. The condition is most likely meningismus or serous meningitis, but the two are often distinguished with difficulty. Localized meningitis or even a generalized suppurative leptomeningitis are possible, but less common. Only the latter two need be considered when the condition appears relatively late in the disease, with the reservation that generalized meningitis may be associated with the scarlatinal infection, but etiologically entirely unrelated.

Frequency of Meningeal Complications.—A clinical experience of 17,311 consecutive cases of scarlet fever has contributed thirty-six patients with meningeal reaction of one form or another. In thirty-one instances the phenomena were attributable to scarlet fever. Five cases were classified as meningismus, two as serous meningitis, four as localized pachymeningitis, and twenty as generalized purulent leptomeningitis.

The other five meningeal complications were only associated with scarlet fever, since the infectious agent had no relation to that disease. Four patients had tuberculous meningitis and one had meningococcus meningitis.

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Meningismus.—Meningismus and serous meningitis have been exceedingly rare in this experience. They are usually associated with the onset of hypertoxic scarlet fever, at present a most infrequent form of the disease in the United States. Some few cases may well have been lost to record, because meningismus is usually a fleeting phenomenon associated with the acute onset and may occasionally disappear before the patient is admitted to the hospital. Clinical histories record a few instances of this sort.

Four of the five patients in this series were less than three years of age, and in each instance meningismus occurred shortly after onset of a septic type of scarlet fever. An older child, aged six years, developed the condition on the forty-third day of scarlet fever in association with bilateral suppurative otitis media and a left lateral sinus thrombosis. All recovered uneventfully. The number of cells in the cerebrospinal fluid was invariably less than 100, lymphocytes predominating. Bacteria were not found microscopically or by culture.

Sachs,[3] however, noted meningismus somewhat more frequently, in four per cent of a series of 400 patients with ordinary acute scarlet fever. Poisseau and Milhit[4] performed thirty-two lumbar punctures among scarlet fever patients during the acute stage of the infection. The cerebrospinal fluid of twenty-three was normal. Two patients with an intense eruption had no neurologic signs but a lymphocytosis. Seven others with meningeal irritation presented spinal fluid findings indicative of meningismus.

Serous Meningitis.—This complication occurred during the illness of two girls, the one three years of age, the other seven. In both instances the onset was about the twelfth day of a septic scarlet fever, following a bilateral suppurative otitis media; both patients recovered. Clinically, the meningeal reaction was more intense than noted in meningismus. The features of the spinal fluid were pleocytosis of 150 to 200 cells, with polymorphonuclear leucocytes most common, a trace of globulin, and an absence of organisms.

Localized Meningitis.—Four patients with septic scarlet fever had localized pachymeningitis. In two instances the condition was associated with left suppurative mastoiditis, once with left suppurative mastoiditis and left lateral sinus thrombosis, and once with left ethmoiditis. Physical signs indicated a localized cerebral lesion. The patient with mastoiditis and sinus thrombosis subsequently developed a right hemiplegia and expired. The possibility of generalized suppurative meningitis was eliminated by the nature of the spinal fluid, physical findings of a localized lesion, and the clinical course. All had relatively few cells in the spinal fluid, 20 to 100, with neutrophiles predominating. There was a trace of globulin, and no microorganisms could be demonstrated by culture or microscopically.

Generalized Leptomeningitis.—Purulent meningitis during the course of scarlet fever is usually due to hemolytic streptococci. The presence of a cloudy fluid does not eliminate the possibility of some other infectious agent. Among twenty-one patients with a generalized suppurative leptomeningitis, one had meningococcus meningitis.

With outstanding clinical symptoms of meningeal irritation, a slightly hazy or even clear cerebrospinal fluid can be compatible with early streptococcus meningitis, but nevertheless should suggest the possibility of a tuberculous or syphilitic infection of the meninges. Tuberculous meningitis was observed four times in association with scarlet fever.

Meningococcus Meningitis.—This infection was observed once in the course of scarlet fever. A girl, aged three years, was admitted to the hospital on the third day of a moderately severe scarlatinal infection. The classical signs of cerebrospinal meningitis were noted the nineteenth day of the disease. The spinal fluid was cloudy and contained 2,100 cells per cubic millimeter. An antecedent suppurative complication has, in our experience, invariably preceded streptococcus meningitis in scarlet fever. No suppurative condition of the middle ear, the nose, or the throat could be demonstrated as a possible primary source responsible for secondary hemolytic streptococcus meningitis. Meningococcus meningitis was furthermore currently epidemic. These factors suggested meningococcus infection and subsequently corroboration was effected by isolation of the meningococcus bacteriologically.

The clinical history contained a note regarding an indeterminate but severe illness three weeks prior to scarlet fever. The symptoms had subsided and convalescence had been relatively uneventful until the onset of the second illness with scarlet fever. Further inquiry regarding the nature of the first illness indicated that in all probability it was a meningococcus infection. A petechial eruption of the skin had been present and the attending physician had considered the condition to be either "brain fever" or typhoid fever. The acutely developing symptoms in the third week of scarlet fever corresponded precisely to an acute recurrence of a chronic meningococcus meningitis, similar in all respects to others observed at that time. Furthermore, a careful search was made for meningococcus carriers among ward contacts as a possible source for the infection. None was found. There had been no previous patients with meningococcus meningitis in that pavilion, nor did anyone contract the infection from this patient.

Tuberculous Meningitis.—Four children with moderate scarlet fever, all less than seven years of age, had meningitis in which the infectious agent was the tubercle bacillus. Two were boys and two were girls. In two instances, the clinical signs of meningitis appeared within ten days of the onset of scarlet fever, in the other two, not until more

than two months had elapsed. All four patients died. At necropsy, the meningitis was in one instance a part of a generalized miliary tuberculosis. Another represented a healed childhood type of tuberculosis with apparently a hematogenous distribution to the meninges. The two patients who developed tuberculous meningitis shortly after the onset of scarlet fever, had neither clinical nor roentgenologic evidence of a primary pulmonary focus.

Scarlet fever, like whooping cough and measles, can favor the extension of a tuberculous infection but seemingly to a lesser degree and less commonly. Similar instances have been more frequent with measles and whooping cough.

CASE 1.—A colored boy, aged six years, was admitted on the third day of a moderate scarlet fever infection. The temperature was 100° F.; the pulse rate, 120; and the respiratory rate, 26. The clinical picture was that of an ordinary scarlatinal infection, but the temperature did not assume a normal level within a few days, as is commonly noted in rather mild cases. On the sixth day of scarlet fever, the patient appeared listless, was irritable when aroused, and complained of his eyes being sensitive to light. During the next few days these signs and symptoms became more pronounced and severe. On the eleventh day the patient appeared stuporous and when attempts were made to arouse him a cerebral cry was elicited. Neurologic examination showed a partial left third and sixth cranial nerve paralysis and paralysis of the right side of the body, including the face. All of the tendon reflexes were diminished and plantar irritation produced extension of the toes on both sides. The temperature was 100° F., the pulse rate 90, and respirations numbered 24. A roentgenogram of the chest revealed some infiltration around the hilus of the left lung. A lumbar puncture was performed and clear fluid was obtained under moderate pressure. The spinal fluid cell count was 190, lymphocytic cells predominating, and the quantitative sugar determination was 51 mg. per 100 ml. Subsequent physical examinations revealed signs of a classical meningitis and the quantitative sugar determinations became progressively lower. On the nineteenth day of illness a second roentgenogram of the chest showed an increase in size of the lymph nodes at the hilus of the left lung. The process was considered to be tuberculous. The patient declined rapidly and expired on the twenty-second day of illness.

Secondary Encephalitis of Scarlet Fever.—In addition to those conditions primarily related to the meninges, the central nervous system may be more extensively involved, so that occasionally the condition of meningo-encephalitis occurs, or indeed, a true infectious encephalitis, in contrast to the toxic condition which is a part of so-called meningismus.

An acute cerebral disturbance is occasionally encountered at the onset of scarlet fever. Judged by the duration of the symptoms and the infrequency of sequelae, the condition is probably best considered as toxic encephalitis. Twelve patients in this series were classified as such. This number is probably lower than actual occurrence because in hospital practice the opportunity to observe patients from the onset of scarlet fever is not presented in the majority of instances.

Less commonly, an actual infection of the encephalon may develop during convalescence and may have a clinical course paralleling that of epidemic encephalitis, not infrequently followed by sequelae. This condition occurred in eleven patients. An illustrative instance noted in a patient with scarlet fever is representative of encephaltis occurring during convalescence.

CASE 2.—A girl, seven years of age, was admitted to the hospital on the third day after the occurrence of a sore throat attended by fever, headache, and the development of a classical scarlet fever eruption. The fever was 102° F.; the pulse rate, 100; and the respiratory rate, 24. The clinical picture was that of an ordinary, rather mild scarlet fever infection. On the twelfth day of her illness a right suppurative otitis media occurred which progressed to mastoiditis and simple mastoidectomy on the sixteenth day of illness. On the following day the patient's reactions were sluggish, but her general physical condition seemed good. On the eighteenth day she was restless and irritable. At intervals on the following day she became quite irrational, and yet most of the time was lethargic and in more or less of a stuporous condition. Lethargy became more pronounced and on the twentieth day of illness the fever was 103° F., although the pulse, which during the previous several days had been high, had progressively declined. Physical examination at this time revealed a marked ankle clonus on the right, a suggestive Kernig sign on the same side with an accompanying positive Babinski sign. There was a right facial paralysis. The eyegrounds were clear. The patient was given a blood transfusion which seemed to result in a favorable clinical reaction. There was consistent progress through the next several days, during which time the abnormal findings referable to the central nervous system gradually disappeared, although the patient continued stuporous most of the time. By the twenty-second day restlessness had become marked and the child was difficult to manage. Her fever had declined to 100° F. Her subsequent course showed progressive improvement and she was discharged convalescent on the thirty-third day of her illness. Spinal fluid examination at the height of cerebral symptoms showed 100 cells per cubic millimeter, a faint ring of globulin and sugar in the proportion of 106 milligrams to 100 c.c. of fluid. The cells of the spinal fluid were almost entirely lymphocytes. The urine was clear throughout her stay in the hospital. A blood count taken during the encephalitic period showed a red cell count of 3,950,000; hemoglobin, 75 per cent; leucocytes 9,600; neutrophiles 79 per cent, lymphocytes 17 per cent, monocytes 2 per cent, and transitionals 2 per cent.

When this girl was admitted in the acute stage of scarlet fever, she was quite the favorite among the nurses, and the comment was frequently made of how well mannered she was. She was most cooperative during examinations, respectful, and courteous. A short time after convalescence this child was brought to the hospital by her mother for a follow-up examination. Her physical condition was good and her weight had increased rather markedly. The most significant sequelae she presented were concerned with changes in personality. Instead of the previously well-mannered, rather retiring child, this little girl had so changed that it was necessary to place her in a school for incorrigible children. Her management had become most difficult. Another striking change was the development of complete agraphia. At the time of the visit she was unable to write at all, but was able to print her name. The sequelae in this instance were both remarkable and striking, and unhappily, revealed themselves not so much in physical alterations as in mental disorders. Prognosis, with reference to improvement in personality, appeared unfavorable.

SUMMARY

During the clinical course of 17,311 cases of scarlet fever, an exaggerated form of meningismus was noted five times. There were two instances of serous meningitis and four of localized meningitis.

The hemolytic streptococcus is the usual infectious agent in suppurative leptomeningitis of scarlet fever. Under very rare circumstances (once in this series), meningococcus meningitis and scarlet fever may exist concurrently.

Latent tuberculosis may become activated or active tuberculosis aggravated in the course of scarlet fever to such an extent as to produce tuberculous meningitis. This occurred four times in this group of patients.

As with other acute infectious processes, toxic and secondary encephalitis occur in scarlet fever. There were twelve cases of the former and twenty-three of the latter in the series. These conditions are relatively uncommon.

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THE ETIOLOGY AND TREATMENT OF ENURESIS

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IT HAS often been stated in the texts of the past that the treatment of enuresis is frequently prolonged and unsatisfactory. With the present means of interpreting and treating this disorder, it is possible now to alter this statement to the more optimistic side.

The purpose in discussing this common, minor, medical problem, enuresis, is to attempt to popularize certain concepts of cause and treatment which are in use in the Psychiatric Liaison Department.† The clinical material used in this paper was referred by the department of pediatrics to the out-patient department of psychiatry of the Colorado General Hospital.

Kanner[1] defines enuresis as the term applied to the inability to control urination in individuals over three years of age. By this age it is found that control has been gained by the majority of children. One differentiates between involuntary urination on the basis of organic disease or malformation (such as cases of cauda equina lesions, and exstrophy of the bladder) and involuntary urination due to the poor functioning of intact parts. In other words, the child with enuresis is one in whom no pathologic condition can be found that can definitely be termed the direct cause of the disturbance. It is this latter type which is under discussion in this paper, the organically determined case being of infrequent incidence and usually requiring surgical therapy or palliative medical measures.

The disorder, enuresis, is more frequent in boys than in girls and is found as often in children with superior intelligence as in those with subnormal intelligence. Usually the duration has been lifelong but frequently one finds a relapsed or an intermittent case. Enuresis usually is present during sleep, in which case it is nocturnal, but it is also present in some subjects in the waking hours, in which case it is referred to as diurnal. The personalities of enuretic children have been studied and classified, but it appears that there is no correlation between the type of personality and the disturbance. All manners of children from aggressive to recessive, restless to quiet, happy to sad, and irritable to pleasant are included. Enuresis should be thought of as a manner of behavior, determined by the structure of the personality and variable

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factors of the surroundings or environment. When present, it is one indication that the organism is not adapting and is not developing or functioning smoothly. A number of other disorders which signify that all is not well with the adjustment, and which may occur with or without enuresis, are temper tantrums, night terrors, fear of the dark, inattentiveness, restlessness, irritability, playing sick, stubbornness, daydreaming, stuttering, lying, stealing, nail biting, occasional rectal incontinence, and poor eating habits.

The nature of the suprasegmental control on vesical activity will not be discussed here (Langworthy[2] and coworkers). The tone of the bladder is controlled by reflex arcs extending as high as the midbrain. The cortical pathways have not been mapped but the fact is certain that cortical control exists. One may speak of this latter as a long-circuiting through consciousness.

We may classify involuntary urination into the organically determined and the functionally determined. A sound classification of the functionally determined from an etiologic standpoint is impossible because the reaction, enuresis, is based on personality structure and environmental conditions both of which have a multitude of variations. To understand this behavior, we not only have to take into account the antecedents, the make-up of the patient, his liabilities and assets, but also the specific situational factors at play. For purposes of clarity, it is best to list the obvious etiologies, keeping in mind that there are all types and combinations of these. Causative factors may be listed as follows: (1) Unstable endowment, (2) lack of training, (3) faulty training, (4) situations giving rise to emotional disturbances, (5) rebellion against situations and attitudes, and (6) the lack of opportunity (Kanner[1]). It is a popular fact that all individuals are endowed differently. Some we term as being unstable and poorly coordinated or knitted. These children are prone to manifest their instability by bed-wetting, nail biting, temper tantrums, and other forms of unhealthy behavior.

Those children who have received no training are, as a rule, members of families whose constituents are ignorant, careless, or so busy with other things that they cannot take time to train the child. Naturally, it is more difficult for the child to learn control if he is unaided. Some of these children fail. Enuresis may merely be just one expression of generalized slovenliness. So often we hear children admit, "Aw, it was just too much bother to get up." There we see how a lowering of the level of awareness diminishes an adequately established cerebral control. After the family realizes that the child is not learning control as he should, they may do other harmful things. Informing the child that enuresis runs in the family, that the father had it until he became a man, gives the child a feeling of futility, that there is nothing he can

do about it. Children are also told that they will grow out of it and that their kidneys and bladder are weak, this also producing a fatalistic feeling.

Recently, the clinic was visited by a widower with his six children. All but the twelve-year-old girl were persistent bed-wetters. There had never been adequate supervision in the home even when the mother was living. The father was well meaning but ignorant. The house was in disorder as were the occupants and they all took their enuresis for granted as did the father, who stated that it was "in the blood," that he had had difficulty himself until he was seventeen years of age.

Kanner[1] notes that overprotection on the part of the mother who has an unconscious desire to keep the child dependent upon her is one situation playing a rôle in etiology. Surely, oversolicitousness by a parent to a child who has not yet learned to control his bladder, will not promote a desire on the child's part to learn self-care.

Next, there are those children who are trained incorrectly. Some children come from homes whose occupants elicit hardly any degree of self-discipline in their eating and drinking, sleeping, and general conduct. We may expect a child from such a home to pattern after the example he sees before him. There may be an inconsistency in the management of the problem. At times the child may be put on the chair regularly and at other times, irregularly. Coddling, interchanged with occasional spankings, certainly is not conducive to the establishment of good bladder control, not to mention the perplexity and insecurity it causes in the child.

This leads to a discussion of the influence of the emotions such as tension, anxiety, and excitement on the functioning of the bladder. In states where there is a mood disturbance, it is a well-known fact that the functioning of the glands, organs, and tissues is disturbed. The bladder works under a handicap in such states just as the digestive and circulatory systems do. Analogously, enuresis may be to anxiety as blushing may be to embarrassment, both being states of disturbed physiology concomitant with an emotion. The child in a state of unrest and discontent is quite handicapped in learning urinary continence with or without training. Many children seen, come from homes which contain factors that tend to keep the child constantly in a state of irritability. Inconsistency in management, arguing in the home, frequent handling and fondling of the child, teasing, and irritable, restless states in the parents are commonly found factors which play an important part in causation and continuation of the disorder. Reactions of those about the child to his enuresis are to be noted. Too often disgust and exasperation are shown instead of encouragement. Shaming, punishing, teasing, and bribery are methods used by a number of parents. These attitudes are harmful and cruel.

The following case is an example in which the above factors were at play and demonstrates the mode of therapy:

E. was a fourteen-year-old schoolboy, the third child and only son of a family of seven children of Norwegian extraction, having a high-strung and critical father. E. had wet his bed nightly all of his life. He had always been a sensitive, serious, conscientious chap, who, in spite of his normal intelligence and average physical endowments, had done poorly in school work. From an early age, the patient was attended to quite faithfully by two teasing, elder sisters. At the time he was first seen, the treatment of his enuresis by the patient was the limitation of fluids. The others were continuing to treat him by teasing, scolding, and shaming, with mother playing an oversolicitous rôle. Treatment in this case consisted in having the boy awakened by an alarm clock twice during the night, getting the boy out of the home more by giving him a Y. M. C. A. membership, and by encouraging the family to discontinue referring to the enuresis. His school work improved and in two months he was having few wet nights. In four months he no longer suffered from enuresis and was a much more social and well-adjusted boy.

We find some children, best described as stubborn, whose enuresis is one means taken to rebel against existent situations and attitudes. Enuresis for this purpose is always accompanied by other forms of rebellious behavior.

A child with a partial bilateral nerve deafness was reacting with many forms of rebellious behavior and enuresis. His parents felt that he was "just mean" whereas in reality he was merely responding to their unjust treatment. As soon as the condition was understood by the parents, the rebellious behavior as expressed by the enuresis, vanished.

Last, in our discussion of etiologic factors, is the lack of opportunity for bladder evacuation. Unhandy bathroom facilities or cold sleeping quarters are of causative significance, especially in rural districts (Kanner[1]).

From the above, we see that the causes are multiple and that enuresis as a form of abnormal behavior is accompanied by other types of pathologic behavior.

The following is an outline that may be followed in history taking which will help to elicit data that will facilitate understanding of the problem and in turn make therapy more rational:

FACTS TO BE OBTAINED IN TAKING THE HISTORY OF ENURESIS

1. Any instability, abnormal behavior trends in antecedents?
2. Type of early training (first three years) at time of breaking, should be described in detail.
   a. Training at what age?
   b. Training by whom?
3. Nature of milieu during early training period and during the later period (arguments, excitements, type of individuals in the home).
   a. Include attitude of people toward the child.
   b. Attitude of people toward enuresis (shaming, bribing, or teasing).

4. Attitude of the child toward enuresis (shame, indifference) and to his environment.
5. Nocturnal or diurnal—just at what hour does it occur and if the child is in bed does he awaken before or aften the act?
6. Duration of enuresis and how constant? Any dry periods? If so, what setting? When were dry habits established, daytime or nighttime? If dry habits were established, when and in what setting did the enuresis recur?
7. What other signs of retarded integration (thumb-sucking, nail biting) are present?
8. Do any other individuals in the home suffer from so-called "neuropathic traits"?
9. What has the child been told as to the cause (weak kidneys, bladder, inheritance, or that he will grow out of it)?
10. What treatment has he received since the age of three (alarm clock, limited fluids)?
11. Any excitement in the evening before retiring?
12. What are the sleeping quarters like (sleep alone; ventilation; where is the bathroom; is the house heated)?
13. If improved, to what does the family consider improvement due? What improvement other than in enuresis is shown? (This is important in follow-up data.)

It is necessary to think of enuresis as being a manifestation of a disturbance in the total personality and because of this it is therefore important to direct treatment toward the individual, primarily, and toward the enuresis, secondarily. Therapy of enuresis has sometimes failed because the above mentioned etiologic factors have not been considered and because the urinary system has been treated as an isolated unit, and not as an integral part of the whole organism. In other words, it is well not to treat the urinary system alone, but the child as an individual.

There are a multitude of therapeutic instruments to be found in texts and periodicals. Some are of value but others are of no value or are even dangerous and harmful. In 1903 Thomas Rotch[3] made the following, still valid, statement: "There is no routine treatment for enuresis. Each case must be studied closely." Treatment must be individualized, must vary from case to case, since each case has a different constellation of etiologic factors. Treatment may be causal or symptomatic. The use of specific methods directed toward the symptom is of value, but success in therapy is greatly enhanced by attending to the more causal factors. Causal therapy is especially important since enuresis is so often accompanied by other minor disorders in behavior. In general, we may divide therapy into two parts: first, that of handling the parents and the en-

vironment; and second, the management of the child. The examination consists of complaint, present illness, and personal history, all of which is taken in turn from both parent and child. The more direct examination, consisting of physical, neurologic, mental status, intelligence examinations, and necessary laboratory tests, is then done. By these examinations one will discover or rule out the presence of toxic, infectious, metabolic, degenerative, or developmental disorders. After the examination is finished, the parent is instructed about the mechanism of urination. He is shown how training and the maintenance of a healthy, constructive environment are important in the learning of all types of control. Any false concepts, such as the belief that the condition is inherited or that it is due to weak kidneys, are cleared away. Concrete personal examples are given to show him that tenseness and excitement do affect continence. Scolding, shaming, bantering, threatening, and any unusual amount of attention should be discontinued. Other factors disturbing the serenity of the situation, such as family quarrels, drunkenness, exciting entertainments, are discussed concerning their relationship to the child, and plans are formulated for the alteration of such. The parent is advised to take a matter-of-fact attitude and to engender confidence in the child by encouraging him. Offering children rewards for dry periods, such as trips or playthings, is not wise and it is felt that the wish on the child's part to conquer the condition is usually a sufficient incentive. Excitement, caused by games, certain stories, and radio programs, should be avoided in the evening since this tends to disturb the emotional balance.

Placing a child in a boarding home for that period of time which is necessary for the correction of his difficulty or difficulties is a procedure used in those patients whose home surroundings for one reason or another are unmodifiable. This has proved to be a therapeutic instrument of definite importance in selected cases. The following is a report of a case in which placement was found to be of value:

E., a schoolboy, aged eight, of subnormal intelligence, was the youngest of four children and the product of a union between a moron mother and a shiftless father. Since birth he had been protected by a solicitous mother and the other children. He not only suffered from nocturnal and diurnal enuresis, life-long, but also from infrequent epileptiform seizures, poor eating habits, temper tantrums, nail biting, fear of the dark, and occasional rectal incontinence. There had been no attempt on the family's part to treat this enuresis, due to their carelessness and ignorance. Physically he was undersized, had chronically infected, hypertrophic tonsils and carious teeth. E. was found to be anxious, shy, and with an infantile speech defect. Because of the inability of the mother to understand therapeutic directions and to change the management of the child he was placed with an intelligent young couple who had another boy of the same age in the home. The child was in the placement home six weeks and in that time wet the bed only once and more important than that was the fact that all of the other habits and traits disappeared.

If a school problem is present, the school should be contacted and the maladjustment remedied as far as is possible. The following case is one with a school problem along with other disturbing factors in the home:

J., a ten-year-old schoolboy of average intelligence, was the youngest of six children, and the product of a union between a tense, moody father and a mother who had suffered from a so-called "nervous breakdown." He was brought to the clinic because he was failing in school, stuttering, having difficulty with reading, temper outbursts, and because he had wet the bed nightly all his life. The mother had always treated him with oversolicitousness. Of late years she had been disturbed by economic stresses. The patient was found to be physically in good condition, was alert, interested, and ambitious. It was felt that the enuresis and all of the other symptoms were the result principally of the mother's oversolicitousness, the tenseness in the household which was based much on financial strains, and the reading disability. In this case therapy consisted of a formulation of the nature of the disturbance to the mother and child, giving the child more responsibility, increasing Mother's Compensation, and by getting the child into a special reading class in school. The enuresis was not treated directly. All of this child's complaints disappeared within six months. This case demonstrates the fact that enuresis may be merely one of a number of symptoms of maladjustment and that causal therapy is effective.

After the parent has been dealt with, the child is interviewed. To be successful with children, patience is necessary. One must train himself to look at the problem the way the child does. Treatment really consists of helping the child to solve his problem in a more mature manner. He is informed that his condition is one that can be overcome, that it is his problem, that he is favoring no one but himself if he succeeds, thus shifting the responsibility to his shoulders. One should attempt to make him less sensitive to the subject, destroy false concepts such as those of weak bladder and kidneys, and any feelings of futility he may have in regard to a remedy.

In addition to the above procedures, certain minor adjuncts may be used. For the first two weeks it is advisable to ask the child to limit his fluids after 4 P.M., the amount depending on the size of the child and the temperature of the weather. He should empty the bladder just before retiring. One should ascertain the hour the act takes place, if possible, so that the child may arrange to have himself awakened by an alarm clock before that time.

The value of the star chart is a mooted one. The child pastes a gold star on his chart for every dry night. Some believe this helpful because it objectifies his improvement and stimulates him to continued surveillance. On the other hand, such a procedure tends to make him attend too closely to the problem of enuresis, in which case the method is detrimental.

Much has been written about the effect of such conditions as septic tonsils, adenoids, phimosis, vulvitis, pinworms, dental caries, thyroid deficiency, and spina bifida on bladder control. When any of these con-

ditions are found in the child who is enuretic, they should be handled just as they would be in the child without enuresis; that is, corrected in order to improve the general health but not with the idea of curing the enuresis.

In conclusion, it is to be emphasized again that after completing history, physical, neurologic, and laboratory examinations, which will rule out any infectious, toxic, metabolic, developmental, or degenerative process, attention should be directed to the personality of the child and its environment. If the nature of the child's problem is thoroughly understood, treatment becomes facile and rational.

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TRICHOBEZOAR

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ABDOMINAL conditions in children require careful study and clinical appraisal before a conclusion may be reached. We present a case of trichobezoar, which although not very common, is important because it does occur and is amenable to treatment.

Bezoars[5] are accumulations of divers materials which form various shaped masses in the stomach or intestines of men and animals. They have been known since the twelfth century B.C. and were looked upon as remedies against various poisons and diseases. The first case was reported by Baudament in the Journal de Medicine in 1779; and the first case reported to be removed by operation was that of Schoenborn in 1883.

TYPES[2]

Trichobezoar, or hairball, is the most common type and is found in young girls who have acquired the habit of chewing the ends of their hair. It consists largely of hair with fibers of vegetable matter and food detritus enmeshed in the hair.

Phytobezoar or foodball is composed of a combination of seeds, skins, and fibers of fruit or vegetable matter with food detritus.

Shellac concretions are at times found in painters or workers handling strong alcoholic solutions of shellac which they sometimes swallow as such or with the addition of water which precipitates the shellac.

ETIOLOGY[2-5]

Trichobezoar occurs mostly in females due to their habit of wearing their hair loose, which predisposes to the biting of the hair. In most instances, the habit has been acquired during childhood and continued for a period of years until detected. While it is not associated with mental deficiency, it is believed to accompany some type of neurosis because of the association of other factors of nervous instability such as enuresis and spasm nutans. Some claim it is due to an inadequate diet, basing their views on the fact that animals with perverted appetites are cured when elements that are missing are supplied. It seems, however, that it should occur more often if it were only due to the diet factor. Therefore, the best hypothesis is that it is probably a combination of diet deficiency and psychic factors that produces the strange desire.

From the pediatric service of Metropolitan Hospital.

The stomach is the most frequent locale, while the bowels may be the site in relatively rare cases.[3] The trichobezoar is usually composed of a large accumulation of hair, which is firmly matted and takes the contour of the stomach. The hair in the mass is usually the patient's own.

The shape of the mass resembles the letter *J* and from it may come projecting processes which may extend into the esophagus or duodenum.

SYMPTOMATOLOGY[3, 4]

A number of symptoms accompany the trichobezoar. A hard tumor in the upper abdomen which is usually moveable and slightly tender on palpation may be present.

There may be mild gastric symptoms with dull aching in the stomach for months or years without the general health being seriously affected, or the symptoms may be severe with repeated attacks of colicky pain and vomiting.

Pain and vomiting after meals may occur with resultant loss of weight and strength. At times strands of hair have been vomited or have been passed by the bowel, thus leading to the diagnosis. Large masses often remain in the stomach for long periods without any marked symptoms or material interference with health. This is due to the tolerance of the stomach to foreign bodies until a limit is reached.

The patient has an unhealthy tired appearance and a very poor color. The tongue is glazed, smooth, and shining. During sleep, restlessness and teeth grinding may be noted; the appetite is poor and the stools are loose, pale, and very offensive.

ROENTGENOLOGIC CHARACTERISTICS[2, 4, 5]

If the hairball almost fills the stomach, there will be canalization of the bismuth along the stomach curvature. It may be seen in the antral portion of the stomach as a clear, round shadow, or a filling defect in the darker shadow of the barium. In the six-hour film, the barium adheres to the hairs, outlining their structure, and making them visible for some time after the meal has left the stomach. If the hairball is loosely packed, the gastric shadow is mottled and the meal will be retained in the stomach for several hours.

TREATMENT[3]

Operative treatment has been successful. Cases have been noted where several operations were necessary to remove overlooked hairballs and hence a thorough examination of the entire gastrointestinal tract should be made, in every operation for hairball, before closure of the abdomen.

CASE REPORT

E. N., a female two and one-half years old, was admitted to the hospital Dec. 7, 1933 with a history of having been ill for two weeks with vomiting immediately after

meals and constipation. For four days prior to admission, obstipation had been noted, and for three days the urine had been dark and scanty.

Past and family histories were irrelevant.

Physical Findings.—Examination revealed an acutely ill child, who was fairly cooperative. The heart and lungs were essentially negative. The superficial veins were prominent over the chest and abdomen and there was a moderate protrusion of the abdomen and umbilicus. No rigidity was noted. A sensation of resistance was present over the upper abdomen especially toward the left half, together with generalized tenderness particularly over the upper half. There was dullness over the left flank, but no shifting dullness, also dullness over the right flank which became tympanitic on shifting the patient to the left side. There was dulled tympany over the epigastrium.

Rectally there were no masses, feces, or blood. An enema gave return of water with a small amount of mucus but no blood or feces. The extremities showed slight clubbing and cyanosis of the distal phalanges.

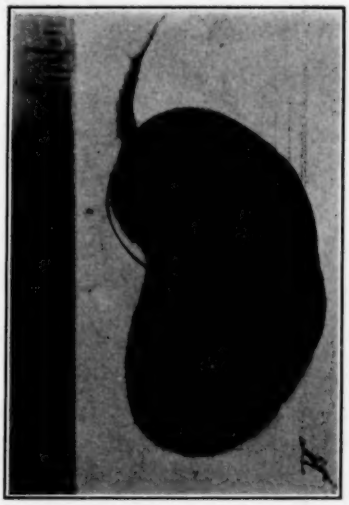

Fig. 1.—Hairball removed from the stomach at operation.

The child apparently understood what was being said to her, but she lay without crying or speaking and with a general attitude of passivity, giving one the impression that her mental development was not up to the normal.

The impression of the case on admission was: Intestinal obstruction (high); pylorospasm; fecal impaction; partial volvulus; tuberculous peritonitis.

During her stay in the hospital, the child had forceful vomiting. Enemas and high colonic irrigations resulted in a small amount of fecal return. No blood was noted in the stools at any time. There was no fecal matter nor fecal odor in the vomitus. The child was drowsy but comfortable, the comfort being out of proportion to the gastrointestinal symptoms. Her respirations were somewhat irregular and costal in character, the abdomen being splinted.

On December 8 a barium enema revealed incomplete filling of the colon. On the twelfth, a gastrointestinal series revealed a pressure defect in the pylorus. On the fourteenth, following one of the many enemas given, the return contained a mass of hair surrounded by blood and mucus. The symptoms still persisted and another

stomach picture on the sixteenth revealed an opaque shadow in the pylorus, which was diagnosed as a hairball. Since it was too large to pass through the stomach, operative interference was undertaken on the eighteenth. A gastrotomy was done and a hard kidney-shaped mass of hair, three by one and one-half inches, was removed.

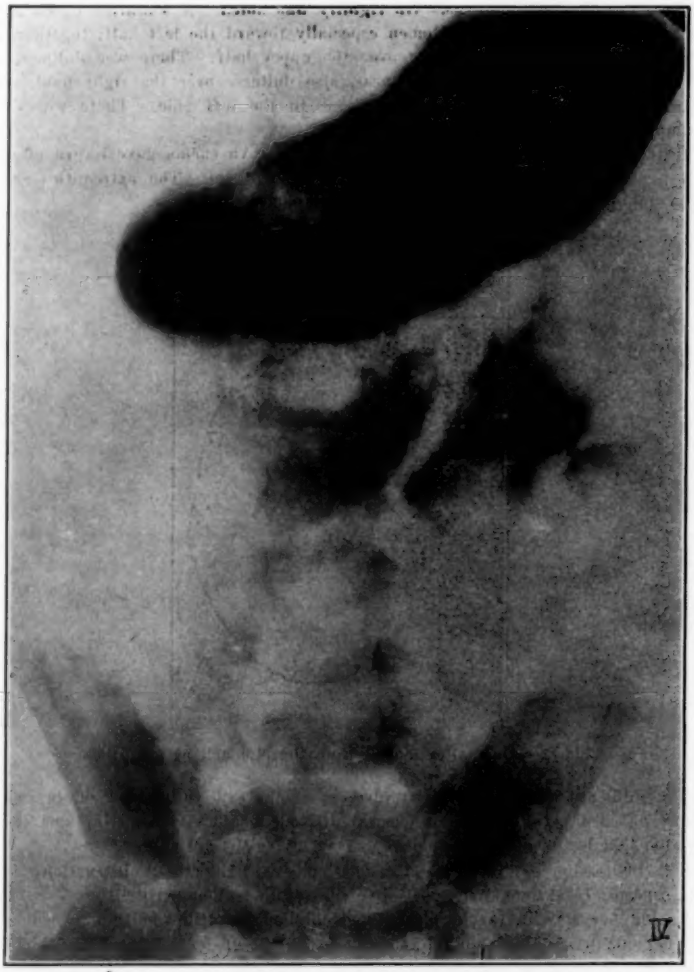

Fig. 2.—Roentgenogram of stomach showing pressure defect at the pylorus. The hairball appears as a light area in the shadow of the barium.

The child had a stormy course, but recovered and was discharged Jan. 29, 1934. She was seen again one year later, but no further gastric complaints were noted.

Laboratory Findings.—December 7, white blood cells, 17,300; polymorphonuclears, 76; lymphocytes, 24; December 11, white blood cells, 11,800; polymorpho-

nuclears, 72 (12 staff cells); lymphocytes, 28; red blood cells, 4,830,000; hemoglobin, 80; December 28, white blood cells, 8,450; polymorphonuclears, 44; lymphocytes, 56; hemoglobin, 90.

Feces on December 15, occult blood positive; Mantoux 1-1000, 1-100, 1-10, negative; blood sedimentation, December 14, 4 mm. in forty-five minutes; blood Wasser-

Fig. 3.—Kidney-shaped opaque shadow in the region of the previously described stomach pressure in the region of the pylorus.

mann, December 15, negative; blood culture, December 16, negative for seventy-two hours; vaginal smears, December 26, few extracellular gram-negative diplococci; January 22, intracellular gram-negative diplococci.

X-ray Findings.—December 8, barium enema, incomplete filling of the ascending colon; December 12, gastrointestinal series, stomach showed a pressure defect

at the pylorus. At five hours, head of the opaque column was in the ileum. At twenty-four hours, head of the opaque column was in the rectum. There was an opaque shadow in the region of the previously described stomach pressure.

December 16 stomach series, stomach showed a large pressure defect in the region of the pylorus. At five hours, the stomach showed the presence of a circular mass simulating a hairball.

SUMMARY

1. A typical case of trichobezoar is presented.

2. Hairball of the stomach should be considered in the diagnosis of abdominal conditions in children.

3. Examination of the vomitus and stool is extremely important, often leading to the diagnosis as in this case.

4. X-ray findings are characteristic as illustrated.

5. Surgical therapy has been successful, but it is very important that a general exploratory be done to rule out the presence of more than one trichobezoar.

6. The prognosis for recovery is very good.

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SOME SUGGESTIONS FOR APPROACHING CHILDREN AND THEIR PARENTS: PART I

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THE modern physician, it is generally conceded, has two functions: one, to get and keep his patient well; two, to educate his patient so that not only the patient's health but also, eventually, the health of the general public will improve. The preventive and educational aspects of the physician's contact are particularly important in his dealings with children and their parents.

Many physicians fail in their contacts with children because they do not know enough about children in the various stages of growth, and because they fail to appreciate the essential unity which exists between the child's intellect, his body, and his emotions.

A successful practice at any age level implies, of course, an understanding of the psychology as well as of the physiology of the patient. In contrast to children, however, the average intelligent adult can bring to bear self-control and intellectual discipline which will help him toward health no matter how unskillful the doctor may be in his personal approach. Many brilliant, highly trained physicians succeed in keeping a large practice and in maintaining a high percentage of cures with adults in spite of an unfortunate personal approach because adults, understanding this doctor's reputation and therefore trusting him, will compel themselves to obey orders and to progress toward cure even though they may be antagonized or offended by his manner.

With children, however, no amount of skill in medicine can compensate for lack of skill in personal approach. Unless the doctor can win cooperation from a child his problem of cure is greatly increased. Children do not have the self-control to overcome antagonism. Rather, the average child, once antagonized, surrenders himself to an orgy of resistance. But, more difficult, and more usual in medical practice than the antagonized child is the child who becomes afraid. Fear is a powerful psychologic factor which must be considered even in dealing with adults; it can, and often does become paramount in dealing with children. The effect of vigorous emotion, working through the autonomic nervous system, and pervading the entire physiology is well known. Blood pressure, pulse, respiration, glandular secretion, muscle tension, ability to absorb and utilize foods and medicines are only a few of the aspects of this disturbance. No physician can hope to get an accurate examination from a frightened or an antagonized child, and treatment is often seriously handicapped by the physiologic reactions which accompany emotion.

Some physicians have a natural "knack" for dealing with children. They seem to understand almost by intuition, and they have at their command numerous resources for winning children. Any physician, however, who is himself a reasonably likeable person can develop this understanding and can learn the techniques necessary for success in dealing with children and their parents if he so desires.

First, he should learn as much as possible about how children grow—psychologically as well as physically. He must learn what to expect from a two-year-old, a six-year-old, a ten-year-old, or an adolescent. How much can each understand of what is wanted and of instructions given? To what motives can one appeal in order to get cooperation and interest? What drives and interests dominate each age level?

A two-year-old, for example, can understand simple instructions in short sentences, but can seldom comply quickly. Children of this age are still at a stage of language learning in which they seem to require time and several repetitions of a request in order to absorb meanings. And once the meaning is absorbed, they require time to mobilize the separate motor acts into a smooth piece of behavior. Ask a two-year-old child to hold his feet and his hands still and to hold his head especially still so that you can look into his ear. Success with this simple request will imply that he has come into your office under favorable circumstances, that your office girl has made a reasonable approach, that your own approach has not frightened him, that he has been undressed with some comprehension of the fact that nothing too awful is going to happen to him, and that he is now clear about the fact that it is his ear that you wish to look at next. With all this assumed one must usually repeat two or three times that stillness of the entire body, and especially of the head is required. The child, meanwhile, is figuring out what your words mean. It may help us as adults to understand this if one imagines that he is a novice at French with someone saying a ten or twelve word sentence rapidly and refusing to repeat it. Once the child understands what is wanted he will have to organize those wriggling feet and hands, keeping them in place before he concentrates upon holding his head still. Sometimes he will hold his head still and the hands or feet will get away from him. One may be able to understand this, too, if one recalls how one learned to play golf. In remembering to keep one's eye on the ball one succeeded, only to forget to transfer weight from one foot to the other. It takes much practice before the several separate skills are blended into a smooth whole. So it is with the very young child. He is learning many new things. If we understand this clearly the necessary patience and simplicity of approach become easy.

But one should be careful not to "talk down" to a five- or a six-year-old child if one wishes to avoid trouble. A child of this age has a vocabulary nearly as large as that of the average adult; if his intelligence

is normal he understands ordinary statements instantly. Repetitions with him teach him that we do not mean what we say, and that we do not expect quick cooperation. One must be sure to have his attention and then say things once, or perhaps, with an interval between, twice only. A child even of this age will require a few seconds to mobilize his motor behavior, since he is still needing practice in the coordinating of his body under the command of his will, so that his obedience is usually not instantaneous. Four-, five-, and six-year-olds, too, are often in the process of overcoming a certain negativism to authority, and may require a few seconds before their wills really wish to take over the mobilizing of their behavior. In any case, it is wise to give them a little time before taking on too firm a manner with them.

Not only should the doctor know what to expect from and how to deal with the various psychologic stages of growth; he should also appreciate the essential wholeness of the child. One can heal the body less successfully if one ignores the mind and personality, since mind and personality are inextricably united with the body in functioning. On the one hand the patient's attitude toward health cannot be separated from his achievement of health. On the other hand the status of the body influences mental functioning and behavior. If the physician appreciates this he will not only enlist all the forces of mind and emotion possible as aids to physical well-being; he will also consider each patient's mental and emotional as well as his physical health. Failing to appreciate this some physicians heal specific bodily complaints, but use such poor psychologic methods in doing so that they leave the patient mentally or emotionally impaired. This is particularly likely to happen with children, who are even more impressionable than adults, and with sick children who are as a rule psychologically more sensitive than well children.

Perhaps some specific suggestions for methods of approach may be helpful. Much can be done in the set-up of the office and waiting room to promote a favorable state of mind toward the doctor on the part of the child and of his parents. The general tone of light, air, cleanliness, and orderliness can do much to convince the prospective patient that the doctor has a regard for the meticulous cleanliness which the general public now expects. A parent will judge this and, usually quite unconsciously, convey an attitude of confidence or uneasiness to the child.

If one wishes to enlarge or hold a practice with children there must be comfortable places in the waiting room where children can sit without cramping or fatigue, and things to do which will keep the waiting time from dragging too heavily. Ideally, children should have appointments made and met in such a way that they are not kept waiting more than a few minutes. Too many unnecessary problems in dealing with them originate in a physically uncomfortable wait on chairs not fitted

to them, over a dragged-out, boring, too-long period. Restlessness and excessive fatigue accumulate rapidly in children, resulting in irritability and negativism which, with careful planning, can often be avoided. There should be in the waiting room comfortable chairs to fit children, so that the back can rest while the feet remain flat on the floor. If possible a small table, spread with simple puzzles, a few blocks, some simple linen picture books or story books. Ten cent stores offer a wide selection of simple, durable playthings and books which permit of sterilization. If a child is happily busy time flies even though he must wait for a fairly long interval. More than this, an occupied mind has no time to dwell on what may happen when one finally sees the doctor.

The office girl should be a friendly person who is sympathetic with children and with their parents. Half the battle with young children lies in winning their parents. In doing this one must remember that parents are often more easily disturbed emotionally about the welfare of their children than are even hypochondriacal adults about their own health. Parental anxiety is often seemingly unreasonable, but one must try to understand this natural parental concern if he is to be successful in dealing with parents. The office girl, then, must be friendly and interested, not in a stereotyped manner, but rather with a genuine concern for understanding this particular parent and this particular child. As she becomes trained she can make many observations of parent and child in the unguarded moments of the waiting room which will be a help to the doctor. She should in time be able to judge whether or not any given parent should turn the child completely over to the doctor and nurse at the waiting-room-to-office door, or whether the child should be accompanied by the parent through the whole procedure of examination and treatment. More will be said about the parent-child relationship later.

Children have often had previous unfortunate experiences with doctors, dentists, or hospitals, so that white-coated attendants instill fear. A colored smock or dress on the office girl tends to remind the child of kindergarten or home instead of a hospital, and, although a minor element in an office set-up, often helps to put children at ease. The office girl's manner, as well as the doctor's manner should be friendly but not excitingly stimulating or intrusively affectionate. Most children resent being tickled or picked up and hugged by strangers. An overhearty greeting will on the one hand stimulate aggressive children into taking an overaggressive command of office equipment and personnel, or will on the other hand terrify timid children. The office girl's best approach to very young children is a quiet, friendly greeting, followed by going about her business so that they can look her over and get accustomed to her. An occasional return with an additional word of conversation, a proffered book to look at, and so on, will serve to

break down the barrier gradually. In general, the doctor's office should become a pleasant place to come to where the child finds a likeable person both in the waiting room and in the doctor's office.

In the examining room the instruments should not be too conspicuous, since these instruments to which the doctor has become so accustomed that he takes them for granted, come into the vision of most patients, particularly of children, as terrifying weapons holding all sorts of fearful possibilities. If possible they should be kept in convenient drawers, or if in a case with a glass front, the case should be kept behind a door or in some spot out of the direct line of the patient's vision.

The doctor will not have the time to spend on cultivating the child's acquaintance that the office girl has, which is an added reason why the office girl should set a good atmosphere. However, five minutes spent in moving slowly at first will often save many times that long in ensuing contacts with the child. Many children need a moment or so to look about. This can be done without handling things—usually while the child is seated in the mother's lap or standing against her chair. If the child is five or six years old or older he can usually leave his mother for whatever treatment or examination is necessary. However, one usually saves time by allowing the mother of a timid child to accompany him unless, of course, the mother is herself the cause of the child's timidity. Whenever the child is too young to undress readily alone, the mother is usually more help than anyone else in removal of clothing. If she is a steady rather than an hysterical person, she is usually the best person to use in quieting the child through a painful experience. Unless the mother is quite neurotic in her approach to her child she should be encouraged to accompany a young child since she represents a security to him that he is not quite able to command for himself.

The matter of removing clothing, especially with young children, often presents a problem. Part of this is due to the child's uncertainty about what is happening to him, and the removal of clothes is the first overt act in his examination. However, children are creatures of habit, and they have been trained, often at the cost of considerable discipline in early childhood, to remove clothing only in the sanctity of their own rooms. After this early childhood training in modesty which is sometimes rather severe, a removal of clothing anywhere but in one's own room represents an intrusion into an intimately personal domain. Gentleness and quiet reassurance are often necessary in order to achieve it smoothly.

Trouble at almost any stage of examination or treatment can usually be forestalled if the child understands in advance what is happening.

"Mother says you have a stomachache. I'd like to have her take off your clothes so that I can look to see if I can find out what the trouble is."

"I'd like to put this [holding up the stethoscope] on your chest right here [pointing to one's own chest] so that I can listen to your heart." Occasionally a child who resists may be won over by, "It goes 'thump,' 'thump.' Maybe you'd like to listen first," and let him listen while you hold the stethoscope.

"Look at this little light. I want to put it in your ear so that I can see. Hold real still while I get a good look."

Warnings of this sort, phrased in any way that seems natural to the doctor, serve to tell the child just what is happening, thus dispelling his anxiety over uncertain and awful possibilities.

This approach implies that the child must never be taken off guard, especially if the experience is to be painful. Once we startle children with a painful experience that we have not prepared them for, we place them on guard against us because they can never be certain that we will not take them unaware again with any sort of fearful experience that their imaginations can conjure. The only way to keep them assured is to convince them that they, too, as well as we, know just what is happening all along the way.

This means that we must never lie to them.

"Look at that box. Maybe a birdie will come out of it," and then we give the first toxin anti-toxin injection. The later injections will be unnecessarily difficult.

Or, "You're going to get an ice cream cone downtown, so get on your things," and he finds himself a few hours later, after a number of unpleasant preliminaries, in a hospital bed with the sore throat which follows a tonsillectomy.

We must not do these things to children, nor allow parents to do them. Whatever ease may be gained in dealing with any immediate situation is lost immeasurably in the ensuing relationship between doctor and child for years to come. If we lie to him once, either directly or by implication, he can only assume that he can never completely trust us again. The doctor is one of the people in the world whom it is most necessary that the child should trust.

This forewarning of the child, however, requires insight and understanding. To warn him too far in advance that he must have an operation is to chance losing valuable sleep and rest. Some children put adults to shame for the quiet courage with which they meet emergencies. But most children fret when facing a fearful experience if they are given too much time to think about it.

And so, just as we have the needle ready for the injection: "I'm going to have to hurt you for a moment. I'll be as gentle as I can, and you can help me a lot by holding still. There, it's all over and didn't hurt too much, did it?"

Something of this sort, which warns the child gently, and tells him that we expect him to be brave, or, better, something which occupies his mind with how he can help, and which informs him as soon as it is over so that he will not remain uncertain as to how long it will last, are great helps. With a long experience, like mastoid dressings, it helps the child to say, "We're getting on nicely. Just a few minutes more. Almost done. There, we're all through," or something which conveys to him that you realize that he is anxious to have it over with and that you are working as fast as you can.

Some children, of course, remain difficult in spite of our best efforts. Whenever possible (as would be the case with well children on well-child practice) such children should visit the office once or twice without anything especially unpleasant happening, or should arrange to come when some especially cooperative child is due for an appointment. Even in emergency treatment, if we can let the timid child see a courageous one have an examination or treatment it often serves to break down the barrier. Children learn from each other far more rapidly than they learn from us.

In general a quiet expectation of cooperation is the best instrument to use in obtaining it. Children, like horses or other intelligent animals, are keen at reading our hidden or unspoken intention. A too-dominating intention solicits bucking or balking from a horse, and comparable behavior from an aggressive child. Fear that one cannot manage a situation results in uncontrolled behavior, since the child senses that he can do as he likes. Quiet confidence on the part of the adult elicits from children not only an awareness that they must cooperate, but far better, a genuine desire to live up to whatever is expected. Children, even more than adults, are deeply influenced by a desire to maintain a reputation, whether that reputation be for good or for evil. Expect bad behavior and we promptly set before them a reputation for badness which they will do their best to maintain. Expect good behavior and by the same mechanism of trying to live up to the reputation which we give them we will, as a general rule, get good behavior.

There are, of course, occasions when physical force becomes necessary. If the child is negative, stubborn, or aggressively spoiled, and if reasonable, cooperative methods have failed, he may need to be put through the procedure to convince him that here, at least, we do what we are told. Even a timid child may occasionally need to be put through some procedure in order to convince him that there is nothing so very terrible about it. However, these occasions should be exceedingly rare. A truly terrified child can never be convinced of anything reasonable by force anyway, since reason does not function when deep emotion rules the body, and force always deepens terror. It is, therefore, as a rule not only a useless, but a positively dangerous instrument to use, since serious psychologic trauma sometimes results from the use of force under

such circumstances. It is genuinely difficult to distinguish between an angry child and a terrified one. When any doubt exists (and the physician should be very careful that he really does understand children well enough to judge accurately) force should not be used unless a true medical emergency exists.

Not infrequently physicians face problems of emotional disturbance in children through no fault of procedure but because some short-sighted parents use doctors as boogies of discipline.

"If you eat that you'll get sick, and then," the tone becomes awe inspiring, "we'll have to call the doctor, and you won't like that because he'll make you take nasty medicine."

Or, "If you don't stop that I'll have to call the great big doctor and he'll take you away to the hospital where they cut people up."

It seems hard to believe that well-meaning parents would resort to such extreme statements as the latter. Yet such terrifying remarks whip children into ready obedience and, therefore, prove tempting enough to claim indulgence from otherwise thoroughly intelligent parents. Child care and parent education experts are doing everything possible to teach parents that doctors must appear as good friends of childhood. But the doctors themselves must do everything possible to teach parents wise handling of children if the best results are to be obtained.

As a general rule history-taking, discussions, and prescriptions should be carried on when the child is not present. Young children particularly, being unable to understand the full import of the discussion, should be protected from the possibility that they will draw false conclusions about what they hear. In the crowding of time and space in the average office or clinic it is easy to neglect this precaution and to proceed to discuss children who are present as if they had no ears. Older children should be given direct instructions and information about every aspect of treatment in which it is possible for them to cooperate. But even they should be protected from the long-time aspects or the less hopeful aspects of their cases unless there is some definite reason for telling them. We too often forget that the chance overhearing of some not clearly understood remark may cause unnecessary panic in a child. More than this, it is not wise to allow a child to develop an excessive interest in the recounting of details of illness.

This applies also to presentation of cases in clinics. Too frequently in order to focus the interest of the audience, a child is brought before the group and kept waiting while the history, symptoms, discussion, diagnosis, and prognosis are presented. If it is necessary to let the audience see the child the major discussion should occur before the child is brought into the room. The answering of questions raised by the audience after the child is presented is ordinarily impersonal enough so that the child is not interested.

Consideration for the child's psychologic as well as for his physical welfare can, with attention and practice, become automatic. Physicians who cultivate a skillful approach to children and their parents will not only enlarge their clientele, but will also be able, by advancing health in children and understanding in their parents, to greatly advance the general level of health in the coming generation of adults.

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Critical Review

MASTOID DISEASE

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THIS very common problem presents for the pediatrician and otolaryngologist a group of cases demanding the full range of diagnostic acumen, medical management, and surgical judgment.

The disease occurs chiefly in the age group of the pediatrician's practice, especially in relation to the contagious diseases and acute infections of the respiratory tract. It coincides most commonly with the age period of hypertrophied tonsils and adenoids, paranasal sinus disease, rapid growth, and nutritional disasters. There are many divergent contributing factors such as the bad results of forceful blowing of the nose, overexposure, fatigue, body chill from swimming, nasal irrigations either done improperly or without the necessary cooperation of the patient, and the very common bad response of the respiratory membrane to a marked deficiency of humidity during winter seasons. Dean[1] has repeatedly stressed the association and relationship of paranasal sinus disease, otitis media, mastoid infections, and nutritional states. Cullom[2] has reported the association of sinus disease and middle ear infections. He states: "It is the same mechanics that give patients a middle ear abscess following irrigation of the nose." In his cases the mastoid involvement was usually on the same side as the sinus involvement. Marshal Taylor[3] has demonstrated the hazards of swimming and presented moving pictures of diving and swimming, showing the importance of proper breathing to protect the nasal sinuses and ears. Chill has been stressed. The loss of body heat from long periods in the water is a very important point. Hilding[4] reports a fatal case of mastoiditis and sinus thrombosis which developed after packing the nose to control hemorrhage in the presence of acute rhinitis.

In all reports of bacteriologic study the hemolytic streptococcus has been the organism usually present in otitis media and mastoiditis. Page[5] reported on the bacteriology in 300 cases of acute infections of the middle ear and mastoid. The hemolytic streptococcus predominated but in his series there was an unusually high incidence of Type III pneumococcus (17 per cent). McGovern[6] reports two cases of fatal otogenic infection with *Bacillus proteus*. Grabscheid[7] of Vienna reports on tuberculosis of the petrous apex. He states: "There are several cases on record of tuberculosis of the cranial vault and of the mastoid process but in practically all instances the conditions were found in children." Meller and Meller[8] (Vienna) report tuberculosis in 22.3 per cent of a series of 84 cases of chronic otitis media. Blegvad[9] (Copenhagen) reports 119 cases of middle ear tuberculosis observed in a twenty-year period. In this group there were 14 children below fifteen years of age. He warns of the danger of paracentesis because of the danger of mixed

infection and destruction of the drum. Absence of pain is noted. Tuberculosis as a cause of infection of the middle ear and mastoid is a rarity in this country, probably because of the rigid testing of cattle and control of milk supplies.

Cultures from ears at time of myringotomy are important. Careful cleansing of the canal is essential. Page[5] after using many antiseptics felt that cleansing of the canal with 95 per cent alcohol before myringotomy was the most effective and practical way of obtaining good cultures. The presence of a Type III pneumococcus in a middle ear culture calls for surgical interference in the mastoid in a large percentage of cases because of the insidious reaction, often with a slow course, low grade fever, and extensive invasion of the mastoid with little warning.

Acute infection in the mastoid of infants may follow closely the course as seen in older children. The process may go on to destruction of the bony cortex with subperiosteal abscess without causing a violent systemic response. The incidence of this type is highest following epidemics of upper respiratory infections, with blocked noses and acute throat involvement. The response to treatment of the nose, throat, ears, and mastoids is good.

The infant with severe systemic response to mastoid infection, i.e., with diarrhea, vomiting, and anhydremia, is still a subject of controversy. There is no more unanimity of opinion at this time than after the early reports by Dean,[10] Marriott,[11] Jeans,[12] Alden,[13] Lyman,[14] Floyd,[15] and Byfield.[16] Cullom[2] stresses the frequency of maxillary sinus involvement in relation to mastoiditis and feels that it is more logical to consider sinusitis as the inciting factor in the diarrheas of infancy. Kopetzky[17] states in regard to Cullom's opinion: "This seems logical. It also adds to the belief that the operations on the ears of infants to alleviate intestinal intoxication are based on empirical rather than scientific data." Dean[18] and Jeans[12] reported the syndrome occurring with sinusitis as far back as 1927. Dean insisted on recognition of ear changes before considering antrotomy and then only after evaluating all other possible causes. Cone[19] reported the occurrence of two types of mastoiditis in infants and noted the difference in operative mortality rates. Variations in the hydrogen ion concentration of gastric secretion permitting the growth of *B. coli* in the stomach occurred in cases with severe infections and this was presented as a probable cause of the vomiting, diarrhea, and anhydremia of infants with mastoid disease. Eagleton[20] states: "Mastoiditis of infants runs a course which is characteristic of true suppurative osteomyelitis, for it is a blood space pathologic process; that is, suppuration within bone marrow spaces."

Crain and Sloan[21] report on a group of 20 infants with acute mastoiditis treated by x-ray therapy. They present the importance of x-ray both as a diagnostic and therapeutic adjunct and state: "Relatively fewer infants in our practice have been operated since this method of therapy has been used." Granger[22] states: "After seeing from 50-60 patients with mastoiditis without bone destruction get well with fractional doses of x-ray, one cannot feel that it is an accident." Schillinger,[23] DesJardins,[24] and Lucinian[25] have reported a series of patients with otitis media and mastoiditis treated by x-ray therapy. Manges[26] included mastoiditis in the group of common clinical conditions in which results under reasonably favorable circumstances are outstanding. Details of dose, frequency, and filtration are given.

The reviewer has followed a small group of children treated postoperatively with x-ray by Dr. Sherwood Moore. In one infant with diarrhea, vomiting, and dehydration, a bilateral mastoid antrotomy was done. The response was excellent but granulations were profuse and healing was slow. With blockage by the granulations, diarrhea and weight loss recurred and the discharge from the middle ear persisted. Following x-ray therapy the postauricular area healed and the canal discharge cleared up. The result in a second case was gratifying. A three-year-old child, four months following a mastoidectomy, developed a recurrent infection of the mastoid with redness, swelling, and tenderness in the scar. One x-ray treatment relieved the pain. The swelling, tenderness, and redness promptly subsided. I would not be willing to sacrifice present well-founded surgical principles in the control of an acute mastoid infection but in the majority of cases there is a time interval where judicious use of x-ray therapy may be desirable as an adjunct.

X-ray as a diagnostic means of following the progress of a mastoid infection is invaluable. The degree and type of development of the mastoid process may give information of a preceding involvement which may alter the course of subsequent attacks. Schillinger[27] in a report on meningitis secondary to mastoiditis correlates the type of mastoid as seen in x-ray with the probable course of extension. He notes the pneumatic, diploic, or sclerotic type and states: "There may be any combination of these characteristics in a single mastoid process. The pneumatic mastoid when infected will produce the classic picture of mastoiditis. The undeveloped mastoid when infected will not produce the classic picture of mastoiditis. When infection does spread, the clinician who has labeled the patient properly will be aware of the situation and act accordingly." Hartmann and Cone[28] in reporting on lateral sinus thrombosis note that variations in size and development of the sigmoid sinus may be apparent in the mastoid x-rays. In cases suspected of thrombosis of the lateral sinus this may be of great value. Stereoscopic films furnish the most information. Hoople[29] reports on development and anomalies of the lateral sinus and includes a case report of absence of the sigmoid sinus in a boy with mastoiditis. The Tobey Ayer test showed a block. Hilding[4] reports a case with false response in the jugular compression (Tobey Ayer) test due to anomaly of the lateral sinus. These rare occurrences serve as reminders that even established diagnostic procedures may be misleading. Substantiation by x-ray, preferably stereoscopic, is a possible aid.

The patient suffering from an acute infection of the mastoid requires close daily observation and treatment, not only because of the disease already present, but because of the many possibilities of complications. In the usual case, although pathology cannot be figured by the calendar, it is considered preferable to wait two to three weeks before doing a mastoidectomy. Shay[30] reports a case in a seven-year-old child where forty-eight hours after the onset of a middle ear infection there was external perforation and a loss of the inner table. The dangers of waiting in such a case are apparent. Looper[31] states in his discussion of Shay's paper: "Every patient with a discharging ear lasting more than two to three weeks should be considered a potential mastoid complication, and unless proven otherwise, should at least have an inspection of the mastoid area." Maxwell[32] in a paper on thrombosis of the sigmoid

sinus complicating otitis media states: "One must recognize that this condition may develop within the first week of otitis media by extension either to the sigmoid sinus or to the jugular bulb."

The value of the blood picture in cases of middle ear infection and mastoiditis is reported by Strumia.[33] He gives staining methods and reviews the importance of nuclear degeneration of neutrophiles and the percentage of young neutrophiles. He states: "The percentage of nuclear degeneration is by all means the best prognostic agent, being a very delicate index of toxemia actually existing."

Gill[34] reports on the management of blood stream infections with special reference to immunized blood transfusions. He lists the most effective medical management as being; (1) blood transfusions, (2) intravenous glucose or saline, (3) antistreptococcic serum, (4) nonspecific protein therapy, (5) bacteriophage. Kolmer[35] in discussion of the above paper stresses the use of concentrated antistreptococcic serum, discusses transfusions, immune donors, and nonspecific transfusion. Woodward[36] continuing the discussion of the same paper states: "In my opinion, there is no definite place today for chemotherapy, nonspecific protein therapy, bacteriophage, or either nonspecific or specifically immunized blood. We do use antistreptococcus serum, but results are both variable and questionable." Hartmann and Cone[28] present a paper on phlebitis of the lateral sinus in infants and young children and review the routine of diagnosis, medical, and surgical treatment. The value of transfusion and lactate Ringer's (Hartmann's solution) is stressed. Sulfanilamide is mentioned as a possible means of control of infections.

Spurling[37] reports 32 cases of brain abscess treated surgically. The importance of his paper in this review lies in the fact that origin of the intracranial infection in 16 cases (50 per cent) was otitic disease.

Suppuration of the petrous pyramid is being more frequently recognized and reported. Kopetzky[17] states that "The surgical literature gives evidence that the topic of petrositis has lost its strangeness and novelty. It is accepted as established otology." Myerson and Rubin[38] present the values of x-ray in two positions and classify four different types of infection of the petrous pyramid. They state: "Most of the patients with otitis media or mastoiditis which terminate in meningitis are considered as having had an intermediate petrous infection." Lempert[39] reports a new approach for the attack on infections of the petrous pyramid. He stresses complete exenteration of the apical carotid portion and lists objections to the existing methods of approach. In the entire literature of petrositis it is the threat of meningitis or presence of meningitis which justifies the surgical attack upon the petrous pyramid. The fact that the petrous pyramid is a possible pathway for extension of middle ear and mastoid infection to the meninges should always be kept in mind.

The literature on the use of sulfanilamide is showing the most favorable results in the groups of infections which are responsible for the greatest number of mastoid cases and mastoid complications, i.e., hemolytic streptococcus and pneumococcus type III infections. The papers submitted by the collaborators in the symposium of THE JOURNAL OF PEDIATRICS, August, 1937, cover a period during which methods of administration, dosage, and blood determinations were being evolved. The results as related to otitis media, mastoiditis, lateral sinus thrombosis,

and meningitis are amazing. Undoubtedly, continued observation for blood changes and possible idiosynerasies will demand constant study in any case in which this drug is used. The determination of optimum blood concentration and the correlation with the results will permit a true evaluation.

Clinically there is one difficulty which has been observed by the reviewer in cases of mastoiditis treated by sulfanilamide. Patients in whom signs of active involvement have subsided have shown extensive bone destruction at time of operation. In one patient showing necrotic cells, pus and granulations over the dura, the drum membrane had healed before mastoidectomy was done. A close follow-up with interval x-rays of the mastoids will be necessary in many of the patients in whom infection has apparently subsided, because it is possible that in mastoid infections there may be a change similar to abscess formation in erysipelas as reported by Basman and Perley.[40] They state: "It is interesting to speculate on the mechanism of the abscess formation noted with the use of sulfanilamide in erysipelas. Apparently the immunity developing in erysipelas is largely a cellular one, and of such a high degree that it is very rare to see an abscess occur in a site recently affected. It is possible that the effect of sulphanilamide is to abort the infection and make unnecessary the development of such high degrees of tissue immunity, so that, if the drug is prematurely discontinued and organisms are still present, the infection terminates by abscess formation."

The reviewer feels that the available evidence suggests that the use of sulfanilamide in the early stages of violent acute streptococcic infections of the respiratory tract should decrease the incidence of otitic and mastoid disease and their attendant complications. When otitis media or mastoid infection has already developed, no false sense of security in avoidance of surgical procedures can be entertained.

The ever increasing means of control of mastoid infections and complications has not decreased the necessity of continuing eternal vigilance and routine care of all patients with otitis media.

The external ear should be cleansed to permit free drainage. This may be done by irrigating with normal saline or boric acid solution or by cleaning with cotton on a probe as often as necessary to protect the external ear and canal from excoriation and blockage of the canal and drum. Accompanying infection of the nose and throat must be recognized and treated. Repeated check on blood findings, red blood count, hemoglobins, and Schilling differentials; x-rays of the mastoids at three-day intervals; repeated tests of hearing using a Bárány buzzer in the opposite ear; repeated examination of the eyegrounds; spinal puncture with cell count and culture; Tobey Ayer test for patency of the lateral sinus; neurologic examinations; and frequent urinalysis may all be necessary if a patient is to be safe during the course of otitic and mastoid infection. Otitic and mastoid disease in children must be taken care of if damage to hearing is to be avoided.

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American Academy of Pediatrics

Proceedings

SEVENTH ANNUAL MEETING OF THE AMERICAN ACADEMY OF PEDIATRICS

NEW YORK, N. Y., JUNE 3, 4, AND 5, 1937

Round Table Discussion on Psychiatry

Chairman: James S. Plant, M.D., Newark, N. J.
Assistants: Leo Kanner, M.D., Baltimore, Md.
William S. Langford, M.D., New York, N. Y.

CHAIRMAN PLANT.—We thought it would be interesting to present a cross-section of pediatric mental hygiene in a little different manner than was done last year. The first paper is by Dr. Wm. S. Langford "Dispensary Problems."

DR. LANGFORD.—Various meetings, such as this, between pediatricians and psychiatrists; the increasing number of clinics for child psychiatry in pediatric centers; and the increasing number of papers on psychiatric subjects found in pediatric journals are ample evidence of the pediatrist's interest in learning more about the care of the large number of children with behavior or personality difficulties whom he sees in his practice. The frequency with which such problems are seen varies, but it is a fair estimate that from one-half to three-quarters of the children who are seen in private pediatric practice present behavior or personality difficulties in addition to the physical illness. Almost 10 per cent are brought because of personality problems only. The pediatrician has had no desire to escape the responsibility for handling these cases. He has found that his empirical methods developed out of his experience have not been satisfactory so he has sought help from the field of child psychiatry. He has asked for methods and tools with which to handle these problems. These tools should be those which can be used in his practice. The answers to these problems are not easy to give and only a few of the more important problems which come up in the applications of psychiatry in the private practice of pediatrics can be touched on in this rather brief presentation.

Feeding difficulties are the most frequent of the emotionally determined problems for which the pediatrician is consulted. These have been said to constitute almost as large a part of his practice as does the common cold. In private practice a smaller percentage of conduct disorders (lying, stealing, truancy, etc.) are seen than in hospital and clinic practice. Fears and anxieties occur in about the same frequency in both groups. Much has been said as to what problems the pediatrician should handle in his practice and the answer is not easy to give. It cannot be done through a classification of symptoms. It must be recognized that the symptoms which the child presents are merely the outward signs of an underlying maladjustment. The underlying causes may be as manifold and complex as are the causes of the symptom abdominal pain. One does not treat the pain until he has found the

cause. The cause of the pain may be one which the pediatrician can treat or it may call for the services of one of the other medical specialists. So it is with the symptoms which we are discussing today. One cannot tell whether they can or should be treated by the pediatrician or the psychiatrist until the child and his milieu have been examined and the causation of the symptomatology determined. After this examination, the pediatrist is in a position to determine whether the situation is too complex for him and should be referred to a psychiatrist or whether he can go ahead. The competence of a given pediatrician to handle a given problem depends on his psychiatric insight and training in psychiatry and psychopathology. If, after examination, one is not sure wherein is the root of the difficulty, a psychiatric consultation would be in order.

There is no need in this paper to go into the details of a psychiatric examination. It attempts to answer the questions: Who is the patient? What does he do? In what setting does he do it? In response to what? And to what end? This does take time and perhaps more time than the average pediatrician is prepared to give. A representative group of pediatricians in private practice were interviewed with an idea as to learning how long a period of time they spent with each new case for an office visit. The length varied from half an hour to an hour and a half, depending on the size of the practice, most of the pediatricians spending a half to three-quarters of an hour for the history and physical examination and all agreeing that, regardless of the reason for which the child was brought, the longer the time spent the better. Two pediatricians, who are interested in the psychiatric aspects of pediatrics, are in the habit of dividing the examination into two parts, interviewing the mother on one day and interviewing the child and doing the physical examination on another. This has solved the time problem and they have found the parents willing to pay for the two visits when they understood the reasons. If the pediatrician is unwilling to take his own medical histories and delegates the job to nonmedical secretaries or limits his histories to checking off lists of symptoms, and so forth, on an outline, he should not attempt to handle this group of problems.

Even if one is unable (or unwilling) to devote as much time as is needed, much valuable information can be learned from the spontaneous comments of the parent during the routine medical history. These will furnish pertinent leads and often sweep one into the midst of the parent-child relationship. It is to be stressed that, just as the child must be considered as a unit, so must the parent- (mother- and father-) child relationship be considered as a unit. The problems of the child are inextricably bound up with those of the parents and cannot be considered apart (although in therapy one may choose to ignore those of the parents). In taking a history one is likely not to see those things for which he is not looking. If the history is taken verbatim, it is packed with remarks as: "He was so small (at birth); he only weighed six pounds"; "He would dress himself if I would let him"; "She acts like she was doing me a favor when she eats"; "He talked late—at a year, I guess"; "He has a temper just like my father"; "My mother, God bless her, I would love to have you meet her"; "Every time I buy him something I feel so funny. I say, 'Suppose he dies, they would fit no one' "; "They say he's so cute, that very word, I have to laugh." The significance of such remarks is obvious, yet the physician anxious to get his routine questions answered in the shortest possible time will either ignore them or prevent the mother from making them. Most mothers will give all of the answers if given a chance to talk.

The symptom is the child's way of solving his problem; the examination is the physician's way of determining how the child is solving the problem; treatment is the way in which the child is helped to solve his problems in a more constructive manner or the way in which the problem itself is removed or modified; the particular treatment for the particular case depends on what underlying problems are causing

the symptoms. Constructive handling of the symptom must accompany the treatment of the child but must not be substituted for the latter just as codeine cough mixture will not cure the cough and should not be used without knowing what the cause of the cough is. The question should not be, "What do you do for enuresis?" but rather, "How can the child with enuresis be helped?" There is no ready-made formula to apply to all cases of feeding difficulties. The very sound (in many instances) routine of "scientific neglect" may be exactly the wrong thing in the emotionally deprived child who wants and needs some attention.

The oversolicitous mother is met so frequently in pediatric practice that she is deserving of special mention. In last year's round table, Dr. Ebaugh mentioned that 75 per cent of the difficulties in a series of 500 cases were due to overprotection on the part of the parents. It does not take a two-hour interview to uncover an oversolicitous mother; a two-minute telephone conversation will often tell the story. Most pediatricians are aware of the fact that exhortations, prayers, and logic do not alter the behavior of these mothers. Pointing out the dangers of their attitudes to the child may serve to frighten the mothers but do nothing further. In our investigations we are obliged to go farther and discover why the mother is oversolicitous before we can help her to change. As with the symptoms of the children, the causes of this attitude are almost as many as there are mothers. One mother may be overscared and overdoctored, fearing that she must at any cost prevent colds in her child who has had one attack of chorea. Another mother may be making up to the child for her own earlier rejection. There was another mother, the only girl in a family where all the boys received professional educations. She resented this and said of her relationship to her son, a pampered, overprotected, hypochondriacal, chronically tired youngster with no abnormal physical findings, "I am his doctor." Another woman, a nurse married to a traveling salesman who was away from home four-fifths of the time, had no interests besides her ten-year-old son, on whom she lavished all of her attention and love and a good deal of quasi-medical knowledge. None of these mothers could, by taking thought, change herself; they all needed help.

The pediatrician is in a strategic position to prevent the development of personality and behavior difficulties. He sees the children early and is able to be aware of situations and attitudes in the home which may lead to later difficulties. A mother said of her first-born, a three-week-old infant, when asked his name, "George, damn it!" She and her mother-in-law had had differences of opinion and the mother-in-law had won.

Infants vary in their acceptance of routine; some take refuge in it, others rebel against it at an early age. Mothers have been saturated with standards for physical and mental growth and development for their children. Feeding problems may well arise from the parental efforts to make the child fit the rigid requirements of weight tables. Procrustean standards for the development of toilet habits may contribute to more or less severe problems in this area. A knowledge of the usual variations in growth and development, both in the somatic and psychic spheres, is important to the pediatrician and with the wise use of this knowledge he may help the family to avoid many worries and unwise attitudes and thus keep the child from being forced to rebel against an intolerable (to him) situation. Self-blame on the part of a parent, no matter what the parent's outward attitudes are observed to be, is a very frequent and important causative factor in the various personality and behavior disorders in children. It takes but a slight slip of the tongue to precipitate a mother into a morass of self-blame for a physical illness or to activate feelings toward the pediatrician. One highly over-protective mother, three years previous when her child had pertussis, had not consulted a physician but had taken her to the corner drug store. She had blamed herself for neglecting the child and attributed all of

the child's difficulties ("chorea," baby-talk, enuresis) to the infection rather than her own oversolicitous attitude, unconsciously designed to make up for the deprivation. There was another mother who felt that she had never given her child (then seven years old) a fair start in life; the illustration she gave was that she had been called to task by a physician for not having given the child orange juice until she was four months old. Physical illness which the parent feels might have been prevented may constitute a logical focus in the attitude of self-blame at the time the child is seen by a physician. The pediatrician, who sees the child and treats him for the usual childhood illnesses, can help to stimulate this attitude or to allay it. The field of child training and care has become most complex; the child is no longer permitted to be like Topsy. As a result of their emotional conflicts and this maze of conflicting opinions and rules, both psychiatric and physical, for rearing children, a great many parents are in a perpetual state of confusion and bewilderment, sure that, whatever they may do, it will surely be wrong. The child is only too aware of resultant hesitancy and indecisiveness on the parents' part. Parents are in need of support and encouragement to go ahead. As pediatricians we are in a position to give them this emotional support, which will make them freer to accept new knowledge, or further to confuse them. In the round table discussion last year in Kansas City, Dr. Helmholz said that he felt the "worry attitude" was engendered by the pediatrician. With confidence in his own knowledge, the pediatrician can help parents in the right direction. He does not need to be confused and put on the defensive as was one young pediatrician when a mother asked him whether jealousy was a "positive or negative trait." He should guard against being drawn into arguments and remember that as a physician his rôle is to interpret behavior and not judge it. Mothers are very likely to try to draw the physician into the position of being a disciplinary officer. The dangers of this are obvious. The pediatrician may be himself drawn into the drama being enacted, in another way; he may unwittingly take sides with either the parent or the child and spoil his chances for therapeutic success.

CHAIRMAN PLANT.—The second paper, "Hospital Problems," is by Dr. Leo Kanner.

DR. KANNER.—"*A child comes to the hospital.*"—Tens of thousands of children are admitted every year to pediatric hospitals throughout the country. They come at different ages, with different ailments of varying degrees of severity and discomfort. Some never leave the hospital alive; the great majority return to their homes after short periods of residence; others must spend many months or even years in wards or private hospital rooms. They come from homes of luxury, moderate conveniences or poverty, from atmospheres of sheltered security or family disruption, from reasonable parental management, pampering oversolicitude or inadequate distribution of affection. For many children hospitalization is an unwelcome removal from a happy home, school, or play life; for some it is a much enjoyed first opportunity to find kindness, comfort, and an interesting escape from domestic monotony or a disagreeable school situation. Unless there is at the time of admission a clouding of consciousness or the suffering is too acute and intense, every child beyond the age of infancy must have the realization that an event of the first magnitude is taking place in his existence and experience. His arrival has been preceded by examinations, diagnoses or diagnostic uncertainties, arrangements, discussions, whispers, and admonitions. He often brings with him peculiar notions about the meaning and functions of physicians, nurses, and hospitals. He may come with confidence or dread, with placid submission, or under violent protest.

It would not be quite fair to expect that the admitting officers take enough time off from the rush of routine to make a detailed study of a patient's background and

the attitudes with which he and his escort arrive at the hospital. When a child is entered in a nursery school or kindergarten, the teacher has not made such an investigation either. But we do rightly demand of her an inviting friendliness and the ability to handle a tyro's fear and resistance and, if necessary, the difficulties connected with his separation from his mother. The teacher's manner may for a long time influence his happiness and behavior at the school. Hospital admissions are often carried out with a gracefulness and charm which cause a child to accept the inevitable as a special privilege. Yet there are situations in which the initial officiousness of an overworked interne or the harshness of an impatient nurse contributes a great deal toward a few days or weeks of mutual irritation and veritable warfare. A youngster is snatched away with force and carried to a bed where he is left unheeded to bewail screamingly what to him seems to be a major injustice. Or his mother is allowed to lie to him that he will be returned to her and taken back home after a few minutes; he waits and waits until the dawning truth fills him with bitterness and justified resentment. Thus an unpleasant first impression may well play havoc with the patient's adjustment and cooperation.

In spite of the absence from home, in spite of the imposed restrictions of activity, in spite of drugs, injections, enemas, and dietary regulations, many children look back with pleasant remembrance to the days of their hospitalization. But there are others to whom the interlude has meant unexplained ordering around by strangers, constant exposure to unpredictable and unexpected procedures, an eternity of boredom, and most peculiar conversations of white-robed persons at their bedside. The latter go under the traditional name of "ward rounds." On ward rounds, a small congregation of people assembles near a patient's bed. One of the group recites a story about the recumbent white or colored male or female, who hears something about his early feeding and development, his present illness and diagnostic terms. Some of the words he understands and some he does not understand. He learns things about diseases in his family. Then follows a general discussion which is sometimes spiced with epithets, such as "very interesting," "unusual," and "strange." Then follow repeated palpations, percussions and auscultations; someone does not forget to voice his prognostic opinions, and then the procession moves on to the next bed. No one seems to realize that there lies a living, thinking and feeling human being, who is left to ponder about the things that were said about him, to brood over his condition and his prospects of getting well. It is remarkable that not until very recently has anyone pointed to the mental hygiene implications of hospital ward rounds. The initiative was left to Dr. Eugene Kahn of Yale University, who has observed the ill effects on adults. Children not infrequently leave the hospital with somatic preoccupations and hypochondriacal tendencies acquired during ward rounds. In teaching hospitals, this is equally true of case presentations to students. It seems that the patient's presence is considered indispensable during the declamation of his case history. He hears all about the mortality rate of his illness and all the complications that may arise from it. It is difficult to see what the students could possibly gain from the opportunity to gaze at the child during the teacher's talk. But it is easy to see how seriously a child may be harmed by the practice of having him witness unnecessarily the physicians' discussions of his illness on ward rounds and during presentations to medical students.

The development of invalid reactions, self-pity, boredom, and undesirable habits is likely to be fostered in chronically sick children requiring protracted hospitalization. Numerous children are confined because of tuberculosis, rheumatic disease, cardiac ailments, and neurologic and orthopedic handicaps. There are hospitals which keep their little patients happy by providing facilities for play, occupational therapy, and the occasional thrills of moving pictures, puppet shows, or story hours.

But there are others which are sadly lacking such facilities. Children spend months in enforced inactivity, left to brooding, daydreaming, or mischievousness or discovering for themselves the pleasures of thumbsucking or masturbation. A considerable portion of their formative years is thus wasted in the hapless monotony of uninterrupted idleness. Adjustment to this type of hospitalization may become abandon to institutionalization, which means a turning away from life and the world at large and a goal that seeks satisfaction in the pettiness of intramural existence.

The examples of ward rounds and occupational needs show that hospitals have indeed a great deal to do with the mental hygiene of sick children. But they can really do much more than that. So many a physician has said to himself that he could help many of his parentally mismanaged patients if only he could get them away from home. Justified fear of losing his patients deters him from making any such recommendations. Illness, necessitating admission to a hospital, comes as an answer to his prayers. The spoiled, overprotected child is away from his indulgent and agitated mother, and there is a chance to reeducate the child who has temper tantrums, indulges in food capriciousness with or without vomiting, is an object of parental bowel overconcern that works with laxatives, suppositories, and enemas, has innumerable aches and pains, is afraid of the dark and gets everything he wants. Successful management of these problems in a hospital can be made to serve as a forceful demonstration to the parents of adequate methods of training. The Harriet Lane Home has accepted this challenge and found that many undesirable family situations have been greatly improved in this manner. But there must be people on the staff who have learned how to deal with such children and their parents. Unfortunately, there are still hospitals in which the hands of masturbators are tied to their beds, the noses are held and food is forced by overzealous nurses down the throats of children who would not eat, and boys are clad in girl's underclothes and called "Lizzie" to shame them out of the habit of wetting their beds. Information about psychiatrically intelligent handling of behavior difficulties is now available and can be easily applied in hospital work with children.

Many more children than come to stay in hospitals are brought daily to outpatient departments. The average pediatric dispensary is a very busy place. Little can be done about the deplorable limitations of space, time, and personnel, which make hours of waiting in crowded and noisy halls an unavoidable calamity. But this cannot possibly serve as an excuse for tragicomical temperature rooms in which children of both sexes are laid bottoms up and sufficiently denuded to allow the insertion of a thermometer into the rectum. Understandable resistance on the part of some children is decried as lack of cooperation, holding up the traffic. Nor should haste and overwork be used as an excuse for shouting at parents and children and remarks which were actually overheard, such as, "If it were my child, I'd brain her," or, "We are going to keep you here if you don't behave." Without a word of explanation, children are sometimes dragged away for tuberculin or Wassermann tests. A mother once raised vociferous objections when she saw blood taken from her child's arm. She thought it was needed for a transfusion and felt that there were children in the waiting room who were much stronger than her delicate offspring. She offered her own blood instead of her boy's. When the nature of the procedure was explained to her, she gladly consented to the withdrawal of blood from the child's arm. Sometimes the mother stands outside the door, not knowing what is being done to her child; suddenly she hears a piercing scream issuing from the youngster, and no one can blame her if she is alarmed and agitated.

But those are, after all, isolated instances. There are, however, two features of dispensary work that are quite general and that, I am sure, every pediatrician would

remedy immediately if he only had the facilities. The one is concerned with the routine of examination and treatment. Lack of space makes it necessary that parent and child are seen at the same time in the same room. The case history is obtained in the child's presence. I know of a number of fictitious family histories given to internes by mothers who sensibly enough did not want their children exposed to information carefully kept from them until then. When interviewed alone, the same mothers are only too glad to cooperate to the fullest extent. A parent's presence in the room during the examination may sometimes be helpful, but in many instances is cumbersome, if not disturbing. Just what can be done about this situation in the face of a tremendous influx to our pediatric dispensaries, I am not prepared to say.

The second point I wish to make is concerned with the information which the parent takes away with her after a dispensary visit. She may have for a long time deliberated whether or not she should take her child to the hospital. Finally the great moment arrives. She waits for hours in the big humming beehive which is the waiting room. In the end, she hears the child's name called briskly; she and the child are taken to a cubicle. She has to answer many questions and then watches the examination. Then follows another long wait until the examining interne or student has managed to catch his instructor or supervisor. Then comes a brief discussion in front of mother and child, the interne writes something on the history sheet, the mother is given a prescription and some practical advice and dismissed, with the instruction to return if things do not go well. After the mother has left, it occurs to her that no one told her what really is wrong with the child and what the examination has disclosed. She may remember that a number of white-robed people have been called in to look at her child, that they exchanged glances and remarks. She does not know, of course, that this is part of the routine in a teaching hospital. She knows only that 6 or 7 doctors have looked at her child, that there must have been something unusual that made 6 or 7 doctors want to look, and that she has not been told what it was. A few words to each parent before she is dismissed could easily give her real and satisfying information about the physician's findings and thus prevent much worry and bewilderment.

When a child comes to a hospital or dispensary, he is not just the incidental carrier of a disease that is to be cured. *He* is not measles, rheumatic fever, asthma, or a sore throat. *He* is an impressionable human being and a member of a family who is very much interested not only in his blood sugar curve or leucocyte count, but very profoundly and essentially in the human being that he is. Medical students and internes receive, in good hospitals, excellent instructions in the treatment of diseases and examination of bodies. If some time and thought could be given to teach them how to deal with the children themselves, our hospitals and dispensaries, in addition to their great contributions to the physical welfare of children, would render considerable service to the preservation and promotion of the mental health of the patients entrusted to their care.

CHAIRMAN PLANT.—The third discussion is "Community Aspects of Pediatric Practice."

DR. PLANT.—In the papers of Dr. Kanner and Dr. Langford you had practical, concrete situations which demand effective intervention. But there is a sort of community framework within which these day-to-day problems lie. These "community" problems belong to the psychiatrist and the pediatrician just as much as to the patient and his family; no one of us knows their answer; they represent an area of adjustment in which we are all groping our way. Admittedly, the medical man is accustomed to a dominant rôle in which he can answer all questions wisely and with finality, and it does not sit well with him that here are perplexities in which he is as much at sea as are his patients.

However, the problems to be discussed naturally arise out of an industrial era, color all of our human relationships, complicate and confuse the daily issues of life, and demand our sincere efforts at developing some sort of livable answer.

As the family is rapidly divesting itself of its functions—as it is rapidly giving over its duties to other agencies—we can either attempt to help its members with the problems naturally growing out of this or we can futilely shout that "we must get back to the family that earlier existed." The basic psychologic problem involved is that of the separation of love from dependence. The family for countless generations has been held together because people loved each other and because they depended upon each other. The mounting divorce rate, the widespread certainty that the family is crumbling, the myriad of problems of oversolicitousness—all these show that a large fraction of what people thought was love was really dependence, and show the tragic panic that persons are in in the face of having to separate these two factors. This is a problem in my family, in your family, in everyone's family.

This same shifting of the functions of the family has markedly decreased the time one takes in the mechanics of living. Cooking, sewing, the demands of a large brood of children—these are rapidly leaving the family picture. The free time from this has gone to many things—bridge, organization of clubs, and similar activities. In large measure this decrease in the preoccupation with the mechanics of living has meant a dramatic and pressing increase in interest in the relationships of living. The pediatrician who was earlier pressed with the trouble that John behaved a certain way is now questioned as to *why* he behaves this way. Parents come to the psychiatrist now quite as much to know why Johnny starts eating spinach as to know why he stopped eating spinach. A world in which we are interested in what we mean to other people rather than in what we do for other people, a world in which we are interested in what we adults contribute to the child in goodness rather than in goods—that will be a better world than any we have had. But, again, the myriad perplexities which this raises now, the questions that come that none of us can answer—these again form part of a framework that conditions every problem that comes to your office or mine.

Out of this same situation has come an intense specialization in, an ever increasing analysis of life. All that the person sees, or eats, or touches each day, comes from nowhere and goes nowhere. We can't even be born or die in our own homes. Many of us work many miles from where we live and build absolutely different patterns of behavior for the different situations in our lives. Our constant plea is for integration; but we live in an analytical world. Whether it is the heart specialist who sees the heart rather than the patient, or the movie house which sees the price of admission rather than the emotional help of its patrons, or the business office which on little pieces of paper records its transactions in millions of dollars worth of goods, or the factory where the worker does his little bit with no reference to the whole which is being made—in each situation that is yours or mine there is this analyzing of life. For the present the integrating factors are gone. Other generations have integrated around the concept of God's interest in all that we do. Others have centered around the individual's contribution to family life. Others have measured everything that they did or thought in terms of financial profit. Again a thousand questions rise in your minds and my mind and in the minds of our patients as to "what it is all about." We cannot provide a philosophy of life to the community but we cannot effectively practice pediatrics unless we realize the fundamental at-sea-ness which our patients feel so keenly now. It is so easy just to order a patient to do this or that, it is so easy to lay down the law to mothers and fathers as to what they should do! You cannot expect them to follow laws and regulations with any comfort when there is this basic question as to what it is all about.

It is part of this same process, I am sure, that has led to the sudden changes in our bases of authority. Most of us in this room were brought up under an unquestioned authority of position. We listened to the teacher or the judge, or the priest, or the father just because of the position which this person had. But now it is different. Most of the parents will tell you that they want to be comrades and pals with their children; or teachers move their desks to the corner of the room so there will not be this symbol of authority between them and their children; or the newspapers tell us every day that priest and judge, office holder, industrial leader, are nothing but real people. This sudden throwing away of uniforms and robes as symbols of stability and authority has created terrific problems for people. You see it in Europe where in sudden panicky fear whole nations rush back to the authority of position. Most of the parents whom I know—and the teachers and the doctors and the judges—have not realized that if you throw away the authority of position you have to substitute the authority of life itself. That is, if I am not going to control my child just because I am his father, then I must control him by the way that I actually live myself. He will have faith in the things in which I have faith, he will be patient only if I am patient, he will be tolerant to the extent that I am tolerant.

Finally, with all of this, is coming a rapidly increasing amount of leisure time. America which cut down trees and built buildings, which dammed rivers and conquered mountains just as avidly seeks something else to do in this new found leisure time. America has escaped into reality; its only answer to the depression was somehow to find more work for people. Here again is the problem, that those of us who have lived in the world about us must now begin to learn to live with ourselves. If Columbus sailed to discover a continent which we could conquer and set in order, so now must a new Columbus discover the ways in which we can live with ourselves.

I have not the slightest intention of pointing out an answer to you. It had seemed to me, however, that the pediatrician must have some kind of picture of the framework of perplexities with which his patients come to him. You have had what I think are some pretty wise and pretty practical statements of problems from my colleagues that emphasize that just as the child's heart can be considered only in terms of his total physical structure, so the child's behavior can be considered only in terms of the totally integrated and interplaying unit of his family. I had thought that we would not have carried through our responsibility if I did not call your attention to the fact that this same family is just as inexorably caught up in the problems of our total culture.

Perhaps you have been disappointed, perhaps you thought that in discussing our relation to the total community I should have set up a scheme of clinics or something. America has always tried to solve its problems by building a little more machinery. I have no objection to that sort of thing and perhaps some time you will let us come back again to talk over these practical steps. Still I think that this is not wisely done until we have something of a picture of the problems which lie before us. You may say that these are none of your business—and in panicky fashion may seek shelter in diphtheria antitoxins, appendectomies, sugar in the spinal fluid, and that sort of thing. I think that I can assure you that all of these items of life are but a part of the total picture and that they get their meaning only from that picture. The pediatrician in the community will not understand the child or his family unless he understands what problems they face and what they are trying to do about these problems. This is not a new idea, but is just an extension of this same view in regard to the relationship of any organ to the total body.

DR. W. EUGENE KEITER (KINSTON, N. C.).—What treatment would you recommend for infants with emotional outbursts? Is there any place for physical punishment?

DR. LANGFORD.—Self-restraint should be taught as part of the growing up process. The emotional outburst is an attempt on the part of the child at attaining power and asserting himself. Substitute therapy should be used. Temper tantrums are based on a feeling of insecurity, which in turn results from parental inconsistency in behavior toward the child.

DR. KANNER.—In general, resort to corporal punishment is a sign of poor resourcefulness. There are children with a sense of guilt who request punishment and who seem to benefit by it (e.g., child who was sent to reform school). Corporal punishment has its place in infancy—a light tap may condition an infant against doing something undesirable. Remember that infantile values are different from those of the adult. Corporal punishment does not explain anything to the child, it may teach him to avoid offensive actions, but does not teach him why.

DR. STEPHEN D. MILLS (WESTFIELD, N. J.).—How do you handle the oversolicitous parent?

DR. LANGFORD.—Determine why the mother is oversolicitous and give her a substitute.

DR. HARRY BAKWIN (NEW YORK CITY).—The pediatrician and social agencies are in no small way responsible for maternal oversolicitude. Rigid time schedules for feeding, strict instructions regarding types of food to be given, sleeping time, sharpen maternal agitation and accentuate the solicitude which a mother normally feels for her child. There are two other bases for the oversolicitous attitude. It may result from a great affection of mother for child; on the other hand, it may result from a rejecting attitude, the mother overprotecting the child because of a sense of guilt or duty. The last is the most—perhaps the only—pernicious form.

QUESTION.—Is not oversolicitousness due to the inexperience of the mother? Ought not wider education help?

DR. LANGFORD.—The function of the pediatrician is to "unscare" the mother.

DR. JOHN LANGDON (PROVIDENCE, R. I.).—It seems to me the biggest problem is the father, who acts along preconceived, traditional lines.

DR. PLANT.—Unisexual control of children by the mother is bad. We must somehow or other bring in the fathers.

DR. KANNER.—Fathers are more often willing to cooperate than may seem apparent from conversations with the mother. In fact, mothers who have psychologic differences with their children often do not want to bring in the father because it increases the complexity of the situation.

DR. PLANT.—During the depression years when many fathers were forced back into the home, there was a reduction in the amount of delinquency.

DR. STANLEY M. WERSHOF (NEW YORK CITY).—Should children who balk at music lessons be compelled to continue with them?

DR. PLANT.—Is this a question of the parent asserting his authority or really wanting the child to learn music? The musical activity must be made interesting.

DR. FRANKLIN N. ROGERS (MANCHESTER, N. H.).—As pointed out, our clinics are too large. Every one, including doctors and nurses, gets tired which produces a state which is sure to defeat the efforts of a psychiatrist who is trying to solve

behavior problems. One might say this problem of fatigue which occurs in overrushed clinics breeds another psychiatric problem in addition to the one the clinic is trying to meet.

In regard to history taking, I sometimes find the protective instinct of a mother makes it impossible to get a good clear understanding of a child's background history. I believe more time should be devoted to obtaining good histories than is usually allowed in a busy clinic. I believe results in the mental health of our children will come from character example set by parents and the gradual release to the child of responsibilities which are not too great for his mental development, giving him a feeling that he is necessary to his home and the activities therein.

As a practicing pediatrician, I feel that we need the help of the psychologists.

DR. OSCAR REISS (LOS ANGELES, CALIF.).—It was only until a few years ago that the section of pediatrics was called the section of diseases of children and most pediatric textbooks were labeled "Diseases of Children." Slowly but surely the emphasis is being changed from *disease* to the *child*. The purely physical aspects of disease are no longer regarded as the sole interest of the pediatrist. He is beginning to see more clearly that each little patient presents emotional and mental as well as physical aspects. To care for him in an adequate manner all of these aspects must be given weighty consideration.

Dr. Plant and his assistants at this round table conference have developed in their discussion the deep underlying reasons wherefore there is need for this broader and more comprehensive viewpoint of pediatrics. It has been well worth while coming a long distance to listen to their words of wisdom.

DR. JOHN G. YOUNG (DALLAS, TEX.).—I feel that the physicians are interested in child guidance and will take everything given to them. The problems in Texas, of course, are different from the community problems such as Dr. Plant describes. It is possible to teach children to use their leisure time, although all of their free time cannot be planned. This problem is consuming in our families.

CHAIRMAN PLANT.—I am glad you brought up the different community problems because, as you pointed out, they are dependent upon the characteristics of the community.

DR. ALBERT J. BELL (CINCINNATI).—The whole discussion has had to do with dispensary and hospital problems but little of psychiatry in private practice. There is no substitute for psychiatric mindedness. In the home it is necessary to see the child and parents separately.

CHAIRMAN PLANT.—It is important in this connection to separate love from dependence; they are two entirely different things and must be considered separately in dealing with the parent-child relationship.

DR. NORMAN T. WELFORD (LA GRANGE, ILL.).—How is one to meet a school situation where the principal insists on using force in getting children to read? As I understand it, psychiatrists have taught us to get away from authority.

CHAIRMAN PLANT.—The difficulty of the situation you describe is that children appreciate the difference in authority. If it was the same authority at home as there is in the school you mention, the children would not resent the latter. From birth, of course, we live under authority. One of the great lessons of life is to adjust to authority which is greater than life itself. We have to adjust in life to authority of some sort. In the past, authority has been expressed in terms of position. Position, or office, however, has been suddenly thrown away. This has led to a lack of authority and has, therefore, resulted in confusion. This is probably one reason why people have been led into dictatorships.

DR. CLAUDIUS V. CALVIN (BRIDGEPORT, CONN.).—What about the effect of radio?

CHAIRMAN PLANT.—There is no evidence that radio leads to delinquency. It must be emphasized that radio and the movies are normal situations to which children must adjust. It has been shown that physiologic reactions to scary movies are no different than to the other kind.

DR. KANNER.—It is not the program that makes for fears but the background. If children are in a proper home situation, there is little danger. Also, with a proper attitude of parents, they will not hold undesirable movie programs.

DR. BERT I. BEVERLY (CHICAGO).—In spite of the evidence presented, I do not agree that children are not scared by movies and radio. I believe, also, it does make a difference what type of pictures they see. In studying the fears of individual children, there is no question in my mind but that pictures such as "Frankenstein" do produce serious nervous reactions which are not obtained with other types of pictures.

BERT I. BEVERLY, Chicago, Ill.
Secretary.

MEETING OF STATE CHAIRMEN OF THE AMERICAN ACADEMY OF PEDIATRICS

The meeting of state chairmen of the American Academy of Pediatrics was called to order at 8 P.M. in the Waldorf-Astoria Hotel, New York, N. Y., by Dr. Clifford G. Grulee, secretary-treasurer, June 3, 1937.

CHAIRMAN GRULEE.—The meeting will please be in order. As the first order of business, I shall present a few matters which the Executive Board felt should be called to the special attention of the state chairmen and then the meeting will be open for general discussion.

The first is the question which has come up in different forms ever since the Academy was started. That is the question of allying people who are not pediatricians with the Academy. The Executive Board did not feel that there was any way in which we could have a type of membership which would fill that situation, but they did feel it was a desirable thing to develop from the standpoint of the various states. The whole proposition was brought to a head by a report from Region III, where it was stated that a scheme was being tried out in Iowa with the idea of associating the men interested in pediatrics with the efforts of the American Academy of Pediatrics. I think perhaps we might right here ask Dr. Hill to report what they are trying to do there. This does not only pertain to Iowa. I am certain it is being tried in other states as well, notably Georgia. But I think the Iowa idea will bring it to a focus as much as that of any other state.

DR. LEE FORREST HILL (IOWA).—I do not know exactly the point of view you want, Dr. Grulee, but in a state like Iowa, with two or three hundred miles from border to border, and with only about fifteen to sixteen Academy members, we are limited in what we can do. Furthermore, the state medical unit is the active organization in a state like ours. If the Academy attempted to do things as an Academy we possibly would not get very far in our activities, so originally the Academy projects we attempted to carry out were through organized medicine committees and channels. We have our state pediatric organization, but it is very small and we have called in to assist us, whenever we have had projects in pediatrics

we wanted to put over, men who are particularly interested in pediatrics or whose work is partly pediatrics; while they are largely general practitioners, they do a good deal of pediatrics, too.

I suppose 90 per cent of the men in Iowa do partly pediatrics, so if we are going to get anywhere we have to ally ourselves with that group. Our own pediatric group, whether members of the Academy or not, have gone out on refresher courses and attempted to give clinics. We are hoping that the state group of pediatricians, whether members of the Academy or not, and those doing largely pediatrics can carry on the work that comes up in the Academy and which those of us who are Academy members take back to Iowa. But we keep rather quiet the fact that it is an Academy idea and we try to work it into the state idea, not as Academy work, but simply as a program for bettering the health of children in our state.

DR. HELMHOLZ.—I think this matter came up through Dr. Moore, who is on our regional committee. In attempting to organize the work in states like Iowa, where there is a relatively small group of pediatricians and a large territory to be covered, as Dr. Hill has outlined, it is an effort to get the group of general practitioners organized a little bit more from the point of view of making them feel they are a part of the movement in the state, not in any way to have them as members of the Academy, but members of the state group who are trying to put this program over, in order to knit them a little bit more closely and have them feel they have a part in this program.

I think if you approach them merely as members of the state society you could not get the cooperation you would get if you tried to incorporate them in a group which is trying to put over a definite program. I think the foundation has been very well laid in Iowa. It was something we suggested they do in developing a little bit further what had already been laid as a foundation and to develop a program which necessitates more than just the members of the Academy. Dr. Mitchell indicated that in a number of the southern states this had already been carried out in much that same way.

CHAIRMAN GRULEE.—There is another phase of this which was also discussed. That was in connection with the work which is being carried on for children and especially the Social Security Act work in the rural districts. It was necessary to organize groups of lay people. The Executive Board felt that so far as possible the physician should be the keystone in any committee that was developed, that unless the Academy attempted to get the doctors interested, we would likely not attain that position.

I do not know of all the programs which have been attempted but I know that Dr. M. Hines Roberts of Georgia has developed something of that sort. Maybe he would like to tell something of what they have done down there.

DR. M. HINES ROBERTS (GEORGIA).—I am sorry that I missed the first of this discussion. In Georgia we have attempted to obtain community participation in our work. About four years ago the Child Health and Welfare Council was organized. An exhibit is presented this year showing our method of organization and the type work which is being attempted. Not only are the health groups included but also those interested in welfare and education. Local child health and welfare councils have been established in 137 counties in Georgia. We have attempted to stimulate these people from our central state organization. We found in the beginning we had much enthusiasm and quite a good deal of activity. However, as the years have gone on much of that enthusiasm is waning. We feel that it will be necessary to carry this program to the community in order to maintain interest and activity.

With this in mind we are planning during the next year to concentrate on certain of our rural counties where need is greatest. We have in mind about fifteen such communities in which we will attempt to set up active child health and welfare programs including not only the health features of the work but also welfare and educational features. Just how successful we are going to be I do not know.

Much depends upon local leadership. We feel that if we can reach the proper people in a given community, inform them of their local health and welfare problems, suggest concrete methods of meeting such problems, very definite progress can be made in our work.

In line with what Doctor Helmholz had to say regarding our cooperation with existing organizations concerned with child health and child welfare problems, we have attempted to bring in all such groups in our work in Georgia. Indeed the nucleus of our local county councils has been composed of representatives of such organizations as the Medical Association of Georgia, the Georgia Pediatric Society, the Woman's Auxiliary of the Medical Association of Georgia, the Parent-Teacher organization, and the Woman's Club. Prior to organization in the county it was requested that the state president of each of the above groups designate his local representative to serve on the county council. In this way the interest of large sections of the community was at once enlisted in the activities of the council.

The medical section of the Child Health and Welfare Council has been concerned in the beginning with education. We feel the lay groups must be informed of their local problems and needs before their interest and enthusiasm can be enlisted. Particular emphasis has been placed upon maternal death rates, the infant mortality rates, and the mortality rates from infectious diseases.

In attempting to solve these problems we have suggested the establishment of immunization clinics, prenatal clinics, and child health clinics. The welfare and education sections of the council have similar programs concerned with the most pressing needs of the community.

If I may deviate a little to say a word about the Child Health Relations Committee and what we are attempting to do, there is a question in that committee as to whether we should attempt all phases of work or whether to continue solely in health work. Most of us, I think, feel without a tie-up with the welfare group we will not do a complete job and for that reason in Georgia we are attempting now to work in close cooperation with the educational group and the public welfare group.

The Child Health Relations Committee was considering this afternoon the possibility of the Academy's attempting some such program in various states, particularly the rural states. In the South we need it tremendously, where in some of the counties we have only one or two or three doctors, many of whom are not properly trained to carry out maternal and child health programs as proposed in Title V of the Social Security Act.

CHAIRMAN GRULEE.—There has been a plan in New Jersey for cooperation and development. I wonder if Dr. Nichols would like to tell something about what happened in New Jersey.

DR. STANLEY NICHOLS (NEW JERSEY).—As you know, our fundamental basis of approach to child health in New Jersey has been on the basis that the pediatrician is the most public health-minded man in the state society. We finished our membership campaign and now have 80 per cent of the membership prepared to do other things which we do not need to go into here. Up to this time, we have used our Academy members through their county societies to bring home to the state medical society, the state department of health, and the county society, and the county local health departments, the fact that we should take the lead and join together in child health work. So we have been busy for several years in joining

together very definitely the state society and the state department of health. In that way we have been greatly aided by some fortunate circumstances which made it possible that some of our members are on both sides of the health department and the medical society fences in undertaking our program of maternal and child health under the social security funds.

We now have developed a system whereby the county societies actually have gone so far as to recommend the medical personnel for the child health work. That is to say in the last year we have appointed between sixty and seventy doctors for child health conferences previously run by nurses alone. These nurses and child health conferences have conflicted with the county medical society for a number of reasons. Now the county society selects men qualified for this work and recommends them to the state department of health.

This does two things. It has its faults in that occasionally a county society will naturally select some doctor who is not qualified but we find the bulk of the medical men in the county society, where a man is not qualified, are the first to request that he be removed if he does not live up to the qualifications for the position to which he is appointed.

The importance of this is that the county society qualifies the men and selects them and they are trained with social security funds. Then organized medicine itself gets behind the program because it is selecting the man and joins in the movement. We feel that this is a fundamental basis. Child health must be built as a fundamental part of public health.

In addition, we have an inter-allied medical professional group in the state composed of the medical, dental, nursing, and pharmaceutical health professions, who work as a unit on things that concern the professions jointly and on which they stand on common ground.

It has been our feeling from the start it was premature on the part of the medical men, in view of the fact our men were *curative* health minded rather than *preventive* health minded (as pediatricians are) to go into more than a cooperative relationship with welfare groups until we had the health professions working together.

All of you who have met this proposition know that health departments and health officers have been in the past on the whole rather suspicious of certain attitudes of the medical profession and with all due justice the medical profession has been so fearful of state medicine and socialized medicine, they have been afraid to deal with health departments. We have overcome that from the state standpoint in New Jersey and are in a fair way in the next few years to overcome it in local health departments and county societies.

We are now contacting the medical societies through the child health committees and other committees of which there are ten to fourteen, in connection with all phases of preventive medicine.

In public health, we soon discovered what all pediatricians know, when you talk about child health you talk about 70 to 80 per cent of the whole public health field. Our pediatric men in the state have worked hard, and we now have a very good working relationship. From this point on in child health our maternal health committee of the state society, the child health committee and the American Academy of Pediatrics work closely together. We are sewing up as rapidly as we can the medical profession with child health in every instance that is contemplated not only in the Social Security Bill, but in any other health program that comes up.

In other words, by this relationship, we have been able to utilize social security funds to make great progress in what we believe to be a sound foundation for child health in New Jersey.

CHAIRMAN GRULEE.—The discussion so far shows very definitely, I think, that this is not a simple problem. It is a problem which has to be worked out in different communities according to the conditions in those communities. There is one other type of state, aside from the larger states, from which we have not heard much. That is a state where there are one or two pediatricians and wide open spaces. We have with us a man who has taken a good deal of interest in New Mexico in the last few years. I shall ask Dr. Wylder to tell of his problems in that state.

DR. MELDRUM K. WYLDER (NEW MEXICO).—Our problems in New Mexico, are, I think, perhaps different from those of most of the states. Arizona and California have much the same problem, back of the coast range.

I looked at it from the side line for quite a while, but this last legislature passed a new public health bill, and our Governor sent for several doctors, among others myself. He said the chiropractors had come to him and requested him to put a chiropractor on this board, also that others had contacted him, but he had come to the conclusion the people who knew more about public health were the doctors, and he would make this board a board of doctors. So we have three doctors and a doctor's wife on this board of five, and if we do not accomplish something it is our own fault. I have assumed responsibility more than before.

It seems to me, however, the point has been raised by practically every one who has spoken tonight that if we are going to accomplish anything we have to have cooperation, we have to work with several organizations. We have to work with the schools and the school authorities to a certain extent and we have to enlist the interest of the public.

The attitude of our board is that public health is preventive medicine. We have had to have some reorganization because we have had some people who wanted the public health body to quit practicing preventive medicine and wanted to enlarge their field and start treatments. We eliminated those people and told them we considered the public health consisted of preventive medicine and education.

I think one of the greatest things we can accomplish in the work of public health is education. In our section of the country, we see these Mexican mothers bringing up their babies under all sorts of conditions. It is not a surprise the baby is ill. Before we can cut down the infant mortality in our country, we have to go a little further in the matter of education.

CHAIRMAN GRULEE.—I think that gives a pretty good cross-section. Some of the eastern states are so well developed they do not feel there is much more to be done along these lines.

DR. WYLDER.—If you will excuse me, I would just like to say as far as the Academy is concerned we now have all in the state who in any way limit themselves to pediatrics, in the Academy, so we have to have some new pediatricians before we can get very much more work done. We have people in our mountains who are seventy and one hundred miles from any physicians of any type.

Report of the Child Health Relations Committee

CHAIRMAN GRULEE.—If there is no further discussion along this line, I should like to read to you the last paragraph of the report of the Child Health Relations Committee.

"The committee feels that the welfare and health of the child can be greatly enhanced, particularly in the rural sections, by the promotion of local county groups composed of persons, both lay and professional, interested in all phases of child welfare. Such organizations should prove a great aid to the various state agencies entering a community to carry out the provisions of Title V of the Social Security

Act. Cooperation between the Academy, the state department of health, the state department of public welfare and various private professional and lay organizations would make such a program possible. It might be well for the Academy to consider seriously the advisability of sponsoring such a movement in the various states."

DR. M. HINES ROBERTS (GEORGIA).—The Committee on Child Health Relations met this afternoon. The members of the committee feel that the Academy, by working in close cooperation with those agencies administering Title V of the Social Security Act, can be of great service in promoting and guiding child health and welfare work in the various states. To this end each state chairman is urged to appoint representatives of the Child Health Relations Committee whose duties it will be to serve in an advisory capacity to all the agencies administering not only maternal and child health, but also to those concerned with welfare and the crippled child.

The committee wishes to stress again the importance of community participation in any program concerned with the problems of child health and child welfare.

CHAIRMAN GRULEE.—That has more or less the same tenor as what we were talking about.

DR. LOUIS C. SCHROEDER (NEW YORK).—Has Dr. Roberts any suggestions as to the make-up in rural counties, how they will go about it to get the men to serve? Who will do the choosing?

DR. ROBERTS.—I suppose you refer to the medical groups.

DR. SCHROEDER.—That brings up the question of what the Academy members can do. In the city of New York, we have about seventy members of the Academy. The amount of work they can do is really comparatively little because New York is full of child welfare organizations.

We have established in New York City a special committee of child welfare in the county medical society composed of fifteen members appointed by the president of the New York County Medical Society. We have felt that it is our duty to know everything that goes on in this city which has to do with child welfare. The child welfare committee in the state medical society is a sub-committee of one of the main committees, which is the Committee on Public Health and Medical Education. That seemed to me rather an anomolous situation, because I have never been in favor of having anybody at the head of child welfare work whose main concern is public health in a general sense. I feel that should be in the hands of pediatricians. That is the reason New York County has welcomed our committee and we have really had the chance to make very distinct contributions to child welfare in the city of New York.

As I see the problem in the state, I frankly do not know how to tackle a problem of that kind because I know nothing about rural conditions. But it seems to me if a rural county medical society had five or six men who formed a special committee on child welfare an autonomous body themselves, and took it upon themselves to know such things as who is doing child welfare work, what the state laws are, and what the infant mortality rates are, it would be a beginning.

It seems to me we have to have men who are Academy members who will take it upon themselves to analyze the situation in every county. If they have not a man who is a county medical man, they must find a man who does most of the children's work in that county. With that as a starting point, it seems to me we will be well on our way toward making the county conscious of the fact that their welfare work for children can be improved.

There is not enough work done along preventive lines. I cannot see any other way to start it than that.

I was hoping to get some ideas about rural conditions. In our region we have two very odd states, you may remember from the last election, Vermont and New Hampshire. I was talking to Dr. Rogers of New Hampshire. He has problems that I have never met. I do not know any solution for them and I am hoping we will have a definitely laid out program for cities the size of three or four hundred thousand up to the larger ones, as well as for the rural communities.

I believe the solution lies in the formation of a special committee on child welfare headed in every instance, or wherever possible, by pediatricians, not by a public health man. How that is to be accomplished, I would like to throw into the lap of this meeting.

CHAIRMAN GRULEE.—Perhaps Dr. Rogers would like to tell you how he meets the situation.

DR. FRANKLIN N. ROGERS (NEW HAMPSHIRE).—I sent a map to Dr. Schroeder presenting the set-up in New Hampshire. Our state is very highly organized. We have a fine set of men at the head of the state board of health, and the department of maternal and child welfare and infant hygiene has been very well cared for. We have now appointed a child health committee in our state medical society. We have included the other health organizations and others who have to do with child health and formed a committee, so that we have the state dental society, the orthopedic society, and the Academy represented.

We have meetings with the state board of health in an advisory capacity only. The state board of health has absolute control over the funds in our set-up. They welcome our suggestions and want to work with us.

We have a map indicating where child health clinics are held and the state is pretty well covered. I think the map shows we hold toxoid clinics often enough so we have the state very well protected from diphtheria. We are cooperating with the orthopedic society, not only getting orthopedically crippled children but the medically crippled and have taken care of them in homes or hospitals to the best of our ability.

I think our greatest problem at present is the orthopedic child where hospitalization is inadequate. On account of short funds the children go to the hospital and do not stay long enough to get well. We have too few nurses on the follow-up work. But as far as child health work in general is concerned, I do not know how much more we can do.

Last year I got together about twelve men interested in pediatrics. We had a very good meeting at the same time the state medical society met and at that time we formed a group interested in pediatric problems. This year we did the same thing and had eighteen in attendance. Our plan now is to form a network and include in every county, one or two doctors who are interested in pediatric problems and who will take care of the work in their respective sections as far as they can.

DR. M. HINES ROBERTS.—Doctor Schroeder stressed the importance of community participation in child health problems and the difficulty frequently encountered in obtaining it. The Child Health Relations Committee hopes to be able to offer to the states more or less concrete suggestions as to how best such group cooperation can be accomplished. When one considers the vast differences in problems encountered throughout the United States, however, it becomes increasingly apparent that no hard and fast rules can be established. They must vary with the communities' needs and facilities.

CHAIRMAN GRULEE.—The Executive Board desired me to call your attention to the fact that we had a broadcast with the Parent Teachers Association during the last year, that most of us have heard nothing but favorable comments on it and the answer to the whole thing seemed to be that the radio broadcasting people

were rather enthusiastic over it because of the fan mail they received. The Parent Teachers Association, I think, has been very well pleased with the whole situation.

I would like to call to your attention the fact that the Committee on Hospitals made a survey of contagious hospitals in the country. Perhaps none of you read it, but I shall tell you the gist of it. Outside of a few large city hospitals, the contagious situation is handled mostly in pesthouses. The conditions are bad and the only suggestion the committee had to make was that some arrangements be made, if possible, whereby in the smaller communities outstanding hospitals would develop contagious units for the use of the communities.

It seems that the chief function of most of the small hospitals, so designated as contagious hospitals, is a place to put a person so he will not infect somebody else, not a place to take care of the child. This situation is not good. It is very bad in most of the places except in the large city hospitals and it should be a matter of attention by the various state chairmen.

I think, if I am not much mistaken, the principal thing to which we want to call your attention further is: First, the Committee on Nursing Education has finally come to life and has made a very definite report. I have had the opportunity to sit in on several conferences of the advisory board to the Children's Bureau and one of the most grave questions the Children's Bureau has to meet now is the fact there is a marked dearth of nurses who have had proper pediatric training. In the nature of things, it seems almost an unsolvable problem.

However the Committee on Nursing Education, under Dr. A. Graeme Mitchell's chairmanship, has worked out with the nursing group something to work upon and they are continuing their work. But the solution is far off. The truth of the matter is the basis of it is probably an economic one. The hospitals of the country do not have children's wards because children's wards do not pay money. There is not a single children's hospital in the United States or Canada, if I am not very much mistaken (at least that was true a few years ago), that derives 5 per cent of its income from its patients and that general situation must be true very largely in the children's wards of general hospitals. Where the nurses cannot affiliate with the children's hospitals they do not receive adequate training in general hospitals.

Report of the Committee on School Health and School Health Education

Another matter to which I wish to call your attention and which I trust each and every one will read carefully because it is fundamental and a thing we have tried to get for a few years and finally have, is the report of the Committee on School Health and School Health Education. Many of you read the questionnaire sent out from our office to each and every member of the Society. I cannot tell you the number of responses that came in but I will say there were quite a few. I know that well over half of the membership contributed. The report of the committee is toward the end of the second part of the mimeographed material which was given you at the desk this morning. I think each and every man should read that report. The conclusions were read in the Executive Board; that very wise organization was quite startled with the fact that somebody else had so much wisdom. It really is an outstanding report. You should try to digest the points they brought out because probably they will in the future represent what will be fundamental in school health and school health education.

DR. ROBERTS.—Doctor Mitchell, chairman of the Committee on School Health and School Health Education, requested that a statement be made to the state chairmen concerning the report of his committee. Although the report is long, he urges that each state chairman become thoroughly familiar with it. Further, that it be given as much publicity in each state as possible. The committee suggests that a

resume of the report be submitted to each state medical journal for publication. It is the plan of the committee to place this report before other interested groups, such as the National Educational Association, and the Parent-Teachers Association.

Nurses Without Pediatric Training

DR. EDGAR E. MARTMER (MICHIGAN).—I wonder if it would be proper to draw the attention of the state chairmen to the fact that because of this dearth of nurses there is, on the part of some hospitals, a very definite attempt to import nurses who have not had pediatric training and consequently attempting to break down the nursing regulations as they apply in the various states, which, after all, are low enough in minimum requirements without lowering them further, even as a temporary measure. We blocked this in Michigan, where there was an attempt to follow such procedure at least temporarily. The nursing law will hold, but the general hospitals are going to make another attempt sooner or later to dispense with the minimum requirements again and we simply have to meet them when the occasion arises. The same thing has probably taken place in some of the other states, particularly along the northern border.

CHAIRMAN GRULEE.—I think it is timely to call our attention to this fact. I was not cognizant of it and I don't know how many were. It seems to me we should be on our toes to meet any such situation and should demand that the nurses who serve children should have proper training with children before they attempt such a thing.

DR. ROGERS (NEW HAMPSHIRE).—I would like to know exactly what the minimum training requirements for nurses are. I lecture fifteen hours a year on pediatrics and nine hours on contagious diseases. The wards average about twelve patients and the nurses have always passed the state board examinations. I feel we need a well-trained pediatric nurse in charge of the ward, but we just cannot afford it at this time.

CHAIRMAN GRULEE.—If you will take your mimeographed material you will find a large table in the report of the Committee on Nursing Education of requirements in the various hospitals for nurses, but I do not know what they are for states.

Council for Pediatric Research

There is one more thing which I believe the state chairmen should have some definite idea about; that is the Council for Pediatric Research. The council was organized some two or three years ago at the suggestion of the Committee for Clinical Investigation and Scientific Research. It was organized at that time with the idea that much money was being put out, especially by commercial firms, and if that went through a third group such as a Pediatric Research Council it would relieve the firms of any question as to the value of the work in the first place and it would take from the man who did the work any feeling of obligation toward the people who paid for it.

Another thing which has come out is that many of these firms have spent thousands of dollars on projects which were not worth fifty cents and they probably would be glad to meet that situation. However the present situation is this: Within the last few months the Carnegie Foundation has agreed to finance this situation for us for two years and we have Dr. Cooley as practically a full-time secretary to make surveys and get things in shape. We think it can be done in two years. At the end of that time there seems little doubt but that the proposition will be able to finance itself very readily. I feel this is a distinct advance. It has gone further in some directions than any other like group have ever gone.

The very fact that the Carnegie Foundation was willing to put twenty thousand dollars, I believe, into this proposition to finance it for two years seems to me to give you a good idea of the soundness of the situation. I felt you all ought to know about it. If there are any comments, we will be glad to have them at this time.

DR. LEE FORREST HILL (IOWA).—Can you explain a little further how that will work?

CHAIRMAN GRULEE.—I cannot tell how it is going to work, but I can picture how it might work. Suppose some commercial firm says it has a situation where it wants to find out the value of some product and has fifty thousand dollars to spend on that proposition. It wants to know where to spend that money to the best advantage and where it can be done properly. The vast majority of these commercial firms do not want anything cut and dried. They want to get at facts. So they say they will give fifty thousand dollars to the Council for Pediatric Research and they want that money put where it will do the most good. Whether the Council for Pediatric Research charges them a commission or whatever way it may be done, they will get some money for acting as middleman under those conditions, and that will finance the council. It will also assure, as far as it is possible to assure, the man who is putting out the money that he is putting it out to advantage and will assure the man doing the work that he will not be meddled with in any way, shape, or manner.

The council is only as good as the members who are in the council. As one man said to me who was not a pediatrician and was not a doctor, "As long as your council consists of the type of men who are in it today, it will go along all right, but I could name some men who stand pretty high who, if you put in that council, would be instrumental probably in having it go all to pieces."

We have enough faith in the personnel of the council to feel it is going ahead.

DR. SCHROEDER.—They would not only do that type of research but also hope to do some clinical research.

CHAIRMAN GRULEE.—It is not all a matter of plain laboratory research. They are just now trying to assemble data on the laboratory possibilities in this country. They are then going to assemble them on the clinical possibilities in the country. Of course, this does not picture only laboratory procedures because, after all is said and done, the final results depend upon their practicability and that means they depend upon their usefulness by the general profession. I talked with Dr. Cooley about that, among other things. I am sure he pictures being able to call upon certain men who are qualified throughout the country to apply the things that may be found. It is not any narrow program of laboratory work although that will probably be the bulk of it certainly at the start.

DR. SCHROEDER.—It might also be interesting to make mention of the fact that some of the research work being done has been instigated by doctors themselves for questionable motives and we have been assured that the amount of this which has taken place is quite large.

CHAIRMAN GRULEE.—That is what I meant when I said they spent a lot of money to no advantage.

DR. HILL.—What I did not understand was how the Carnegie Foundation came into the picture.

CHAIRMAN GRULEE.—We asked them if they would finance it. The money is turned over to the Academy and the Academy disburses it. They have given us

the money to go ahead and organize our council. They have no strings on it at all. They insisted the Academy handle the funds, not the council. We will keep it as a separate account.

DR. HELMHOLZ.—It is rather interesting to note that the Rockefeller Foundation and several others before whom this plan was laid were unanimously in favor of it, feeling it was a very definite step in the right direction.

Journal of the Academy

DR. ROGERS.—In looking over the pediatric journals, I rather miss the part that is included in the *Journal of the American Medical Association*. I think we are missing a wealth of material as pediatricians. It seems to me it would add to the value of the journal if there were something of the bright sayings of the children of the members of the organization and also the patients. I do not wish to make a motion or recommendation to the Executive Board, but I would like to know the feeling of others on this matter.

DR. SCHROEDER.—The editorial board of the journal has been very anxious to make the journal a real personal thing. As you know, they do run a column called "Comments" and I know Dr. Veeder has been disappointed that so few men write for it.

CHAIRMAN GRULEE.—I do not know much about the editorial work in regard to THE JOURNAL OF PEDIATRICS, but an editor of a journal can get plenty of suggestions as to what he ought to do. He is criticized on one side because he does one thing and criticized on another because he does not. I think we could at least tell Dr. Veeder what has been said. If any of you feel the way Dr. Rogers does, I wish you would express it, and if you feel otherwise express it. I think sometimes we are a little too inclined to take our science too seriously and a little lighter vein does not hurt once in a while.

DR. MAURICE L. BLATT (ILLINOIS).—The solidity of this organization is based on personal contact. Whatever has been accomplished by the American Academy of Pediatrics has been accomplished because most of us know one another. We lose that contact by the impersonality of scientific papers. If the personalities which the Doctor suggests were put into the journal, it would have value in knitting the group more closely. I would be in favor of it.

CHAIRMAN GRULEE.—I am not talking against this but I want to tell of another side. On many occasions I was severely criticized for including in the *American Journal of Diseases of Children* the medical biographies that were written. Strange as it may seem, they said it was not something that was strictly medical and did not belong in a scientific journal. Some of that could have been said to be in the lighter vein. It is a delicate situation but I would not be opposed to it. I think the place to include it, as Dr. Schroeder suggested, is under "Comments"; somebody might write in and give a story to see how it works out.

Summer Camps

DR. WARREN R. SISSON (MASSACHUSETTS).—Would it be pertinent to ask if there is any interest in summer camps?

CHAIRMAN GRULEE.—I believe Dr. Helmholz can tell about that.

DR. HELMHOLZ.—We have had a number of conferences with the president and director of research of the American Camping Association. They have just received a gift, of twenty thousand dollars from Mr. Chrysler for an investigation of the camp situation and they are planning to go ahead with it this summer. We

have shown our willingness of cooperation in connection with the medical side of the work. That is as far as we have gone. They are first of all, trying to gather information. I think they represent a group of about 800 camps. If I am not mistaken, there are some 22,000 camps of various types. Apparently it is a much bigger problem than we had any idea of, so we have just sort of marked time in view of the fact that they were gathering the information. We have been trying to help them not only in getting adequate medical attention for their camps but also to set up minimum standards for medical work in camps which apparently is very essential.

Playground System

DR. JOSEPH STOKES, JR. (PENNSYLVANIA).—What about the playground system?

DR. HELMHOLZ.—The Committee on Cooperation with Nonmedical Groups and Societies has not contacted them. It is a slow process. We feel we have made progress in putting over the forum with the Parent Teachers Association and getting our contacts with the camping organizations, but there are many organizations we ought to contact.

Annual Dinner

DR. STERLING H. ASHMUN (OHIO).—In line with what the Doctor suggested a while ago, what would you think of having an annual dinner?

CHAIRMAN GRULEE.—I would not care if somebody else ran it. We have always rather shied clear of any amusement features. If we embark on social programs, we may have quite a load. If we do, I trust you will appoint a social secretary for the organization, as long as I am secretary.

DR. ASHMUN.—I heard a remark not later than this evening that this Academy was the only society this person knew of that did not have a dinner meeting. We have one for the A. M. A. pediatric section. I think if you could have one here it would fill a need or a personal contact that is not filled by the A. M. A. section and it seems to me this is going to be more of a separate entity all the time. So many men who usually attend the meeting of the A. M. A. this year expressed the feeling they could not attend both. So certainly they miss that social side if we do not have a dinner.

CHAIRMAN GRULEE.—That is up to the members of the Academy. If they want a dinner we can have one, but I say we will try to have somebody else work that up. I am perfectly willing to do it if you do away with the round tables, but I think the round tables are going to split the Academy wide open one day if you keep on. I shall ask you to use your influence to keep the membership mollified on the round table situation because we cannot satisfy everybody. If it is to be a round table, it cannot be larger than those we have now.

We will take a vote on this matter. All those in favor of having an annual banquet please rise. All those opposed please rise. (Thirteen favored it; twelve were opposed.)

DR. ROGERS.—I think this should be a three-fourths vote. I would not enjoy having the banquet unless three-fourths of the men were in favor of it.

CHAIRMAN GRULEE.—The regions very often have dinners. Region I had a dinner last year, I believe also the other regions. I think we will let the matter simmer for a while. There is a good deal of difference of opinion apparently as to its advisability.

Social Security Program

DR. HILL (IOWA).—Have there been any new developments in regard to the social security program?

CHAIRMAN GRULEE.—Dr. Eliot, do you want to talk about any changes in the social security plans?

DR. MARTHA ELIOT.—I might say there is nothing new at the present time. Apparently the appropriations for next year, unless Congress proceeds to cut them after the two houses passed them, will be the same. As to the appropriations to the states, I think there is no definite sentiment in Congress to cut those appropriations. I think perhaps they may cut the Children's Bureau's appropriation, which possibly does not affect you as much as it affects us. The programs themselves are developing, I think, extraordinarily satisfactorily. If we look back a year and one-half to the time when they were getting under way and review the type of thing that has been done in the states and the new plans that a number of the states are now getting under way for next year, we certainly find ourselves feeling quite satisfied with the progress that is being made. Of course, there is a long way to go in many situations. There is a considerable way to go with respect to the problem of cooperation between the public official agency that has the control of the planning and the budgeting and development of the plan, and the carrying out of the plan.

In many of the groups in the community, and by that I consider the state as a community, and also in the local community, we hope that progress will be made in this line very definitely during the coming year.

I was not here to hear Dr. Roberts' report, but in the meeting of the Committee on Child Health Relations this afternoon a number of the members of the committee made suggestions with respect to community organization, and I think it is one of the outstanding needs in the program. Ninety-nine times out of one hundred, I believe, the need for the development of that community organization must come out of the communities. If it is a state organization, it must come from the state, from the people in the state, and if it is the local community, county or city or even rural area, the community organization, if it is going to be sound, must develop out of that community.

I think a great deal of leadership can come from the state organization and I think the opportunity that the Academy chairmen and the committees have in pushing forward such community organizations is extraordinarily great. If you could get together with the committees on maternal welfare and try together to push that forward it would be the greatest help to us and to our medical field consultants that you could possibly give in furthering the plans in the states and helping the state health departments to develop their own plans. There is nothing that is specifically new at the present time as far as I know.

DR. BLATT.—Has anything been done in regard to the crippled child, the cardiacs, and mentally crippled as well as the orthopedics?

DR. ELIOT.—A number of the states are including cardiacs.

DR. BLATT.—Could we do anything in Illinois? Our great problem is the mental child.

DR. ELIOT.—If the agency dealing with the problems of crippled children were to attempt to include the mentally deficient, the amount of money the state agency has would be dissipated widely over this enormous group. The amount of money appropriated by Congress, the amount of money appropriated by the states and local communities for the crippled child program, I think, totals approximately seven million dollars. Of that $2,800,000 is federal. The cost of care for the mentally

deficient children, if they were to be brought into that program, would be exceedingly great. To extend the crippled child program so that it includes perhaps physically handicapped as well as those children who are commonly described as crippled, meaning orthopedically crippled, would be perfectly possible. I see no reason for not so doing. At the present time, the total amount of money appropriated by the states or the federal government is relatively small to meet that very large need.

DR. BLATT.—There would be no objection if we could get the state to appropriate more money to include in this piece of work those cardiac cripples?

DR. ELIOT.—I think the cardiacs might be included at any time.

CHAIRMAN GRULEE.—The trouble in Illinois is that the Secretary of State has ruled a cardiac is not a crippled child. It is not a federal ruling. Like the tariff, it is a local question. There has been no federal ruling on the matter because they could not make one. As I understand, it depends on the definition given "crippled" by every state.

DR. ELIOT.—That is the principle we are following at the present time. How long that will continue I do not know. The main reason is that we wanted each state to develop its own plan. It is important, however, to keep a broad point of view with respect to this program. However, again I reiterate, the funds are too limited to stretch them out thinly over too many types of handicaps.

Age Limit of Children for Pediatricians

DR. EDGAR E. MARTMER (MICHIGAN).—Does the Academy have any arbitrary age limit beyond which a pediatrician should not go?

CHAIRMAN GRULEE.—I can only answer in this way. If you will notice very carefully, the Academy has taken a great deal of interest in the question of adolescence in the last few years.

DR. MARTMER.—I think all who read the article by Moss did so with a great deal of encouragement. It seems to me the Academy could help to educate us in this field of adolescence. I do not think anybody knows anything about it. We will take, for example, the question of menstrual irregularity in young girls. The gynecologist tells them it will straighten itself out all right. It seems those problems should come within our scope. I do not believe in going too far the other way, but I think adolescence and the problems that arise when they change from childhood to adult life should be considered.

DR. EDWARD B. SHAW (SAN FRANCISCO).—Pediatrics has been defined up to sixteen years has it not?

DR. ELIOT.—I stated a few moments ago there was no new program under way. I would like very much, however, to tell this group briefly about the recommendations that were made by our advisory committee to the Children's Bureau as to what we ought to do and what ought to be done in the states. The reason I did not mention it first was because there was no immediate prospect it could be put into action. But I think it is interesting to appreciate that our subcommittee on maternal welfare at a meeting early in March made a definite recommendation to the Maternal and Child Health Committee which in turn passed on the same recommendation to the general advisory committee made up of physicians and representatives from a number of organizations interested in the work of the Children's Bureau. These recommendations covered really two major points.

The Maternal Welfare Committee was enormously impressed with the needs that have been discovered in the past year or two, have been known for a long time but have been coming more and more to light with respect to the medical care at the

time of delivery and the need for more nursing care at the time of delivery. The committee was interested not only in the effect on the mother, but also the neonatal influence. That is where the pediatrician comes into the picture very decidedly. The committee, meeting at the Children's Bureau, viewed the situation and finally arrived at these recommendations, which I cannot give verbatim. You will find them published in the *Journal of the American Medical Association*, I think, the very end of April or the first of May.

The first recommendation had to do with the development of sources of funds to develop the maternal and child health program along three lines. First funds to provide payment for physicians for women delivered in rural areas and in certain of the smaller cities where funds for payment were not available and where the women themselves are not able to take care of this cost.

Second, there should be nursing care provided for women at the time of delivery.

Third, in emergency cases hospitalization should be made available for these women unable to afford this service themselves.

Lastly, that consultation services in areas where consultants are not now available should be made available.

The second major subject had to do with training in the obstetrics field and pediatric field, and the committee strongly recommended there should be developed centers for postgraduate training for the general practitioner in obstetrics and in the care of the newborn infant, a recommendation which could be carried out if funds were available. It would make it possible for the general practitioner in rural areas and cities to get added training in obstetrics and in this problem of the care of the newborn. Whether that can be carried out depends entirely on whether there will be more funds available.

DR. ROGERS.—I would like to ask Dr. Eliot a question. In looking over the maternal death rate chart for the United States, we noticed that the middle western states have the lowest maternal death rate. Is it possible they have better maternal care? Our committee, meeting with the state board of health, spent a full half hour trying to figure out why this was so. We couldn't believe they had better care than we have. We concluded it was racial influence.

DR. SCHROEDER.—I think perhaps it covers the middle west and northern section; it does not apply to the South.

DR. HILL.—I would like to hear an expression from men whose states are largely rural as to how much difficulty they are encountering in the county medical societies in attempting to institute the program Dr. Eliot just told us about. In Iowa, mentioning federal money and federal programs, is a good deal like waving a red flag in front of a bull. I am interested to know whether any of the other men are experiencing this sort of attitude on the part of the general practitioner which they feel is an invasion of their rights and their own individual practice.

DR. HELMHOLZ.—We cannot come into a community except at the invitation of the county medical society. I think that is practically the mode of approach in all the counties.

DR. HILL.—If we fail we are in trouble.

DR. HELMHOLZ.—I suppose that is as it should be.

Proposed Changes in the By-Laws

CHAIRMAN GRULEE.—If there is nothing further, I believe Dr. Helmholz would like to explain to this group the proposed changes in the by-laws.

DR. HELMHOLZ.—I thought inasmuch as it was this body which was mainly concerned with the change in the by-laws it would be well to discuss the matter here

before the general meeting tomorrow morning. It has been my feeling, and we have discussed this matter in Region III a number of times, that in the development of the Academy the group of state chairmen would play an increasingly important rôle and there should be some direct hookup between the group of state chairmen and the central organization; that is the Executive Board. It was on that account that two years ago the matter was brought up and at the last meeting of the Executive Board in December this change in the by-laws was suggested.

It was felt that from the point of view of knitting together the organization in each one of the four districts we would have a closer association if there was a direct contact between one member of that group and the central organization. As you have noticed from the wording of the by-law, a member selected by your group and passed on through the regional chairman is to be appointed by the president as a member of the Executive Board. So there will be a representative from each one of the districts sitting with the Executive Board. We feel in that way we will have a very much more intimate contact, a greater possibility of extending the work from the central agency out into each individual state. That as a corollary to this change, the Regional Committee, instead of being a committee, would consist of the regional chairman and his cochairman.

We would like to hear any discussion you may have to offer because from the point of view of the state chairman it is the most important change that has been brought forward since this group has been organized.

CHAIRMAN GRULEE.—This organization started seven years ago as rather a small body. It has grown to rather large proportions. The extent of its influence is becoming wider and wider. Its interests are extending likewise and what we need is men to carry on. We have to develop men from the rank and file of our own groups. The state chairmen are probably the men who will carry on in the future. Many of us have been in the shafts a long while and it will not be many years before we will either have gotten out or died in harness and somebody has to carry on. We have to develop young men for these efforts. That is another side to this matter aside from the more democratic organization. The perpetuation of the race, as it were, is necessary. The only way we can get men really educated as to the vast extent of the work we are doing is to have them sit in and hear the discussion of what transpires at the Executive Board meetings. We hope it will work out that way and we will be able to have our leaders develop right in our group, because leaders are necessary in every branch of work. It is not only a matter of developing a more democratic system, it is a matter of developing a knowledge of the men who can carry on for the future.

Continued Discussion on Pediatric Age Limit

DR. ASHMUN.—A few years ago I was asked to find out or make a survey to find out the pediatric age as approved by the different regions of the country. At first it did not seem of so much importance what the age limit was in New Orleans or whether it was the same as in Toledo, but when you come to making out your statistics and making the hospital surveys it is of considerable importance that the age limit be the same. For instance, in Chicago the pediatricians told me for several years they lost credit for a great many pediatric cases because the surgeons insisted on taking everybody over who had a pain in the belly. They became surgical cases and regardless of age were not credited to the pediatric department.

I found in asking the pediatrists in six different hospitals scattered over the country that fifteen years was the age at which they began the adult admittances. In other words, they did not go through the fifteenth year to the sixteenth but to the fifteenth year. These hospitals which I investigated were scattered about the country from New Orleans to Chicago and through the east. They did limit their

age through the fourteenth year, beginning the fifteenth year as adult patients. As some one said, if the pediatrist does not know the adolescent work and take an interest in it, God help them, because no other group does.

It was brought out in the psychiatric round table today that it is up to us to carry on at least to that age. Over the radio I once heard a very popular program announcer speak of puberty as the age from ten to twenty-five. So we have great limits ahead of us yet, but I think the Executive Board might well announce the prevalent opinion as to the correct age limit.

CHAIRMAN GRULEE.—I might say that in hospitals the children's wards are not open to children of the age of puberty for obvious reasons. That has perhaps been an unnatural limit to what we have taken on in practice. I do not think it is up to the Executive Board to make a definite statement as to what it thinks the limit should be. I think the situation is far more complicated than that, and I would entertain a motion that this be referred to a special committee appointed by the president to report at a later time. It seems to me it is of sufficient importance to be considered in all its phases before the Executive Board which really is an Executive Board and not nearly as learned as it looks.

DR. ASHMUN.—I make that as a motion.

DR. NICHOLS.—I second the motion and as part of that motion I suggest that some thought be given by the same committee to the question of how closely we have a working relationship with the Maternal Welfare Committee. This comes into the middle of this picture, this adolescent problem itself. In some senses it is divided between the pediatric mental hygiene and the gynecologic side of maternal welfare.

In our program, in regard to social security, there should be the closest kind of working relationship committee between the American Academy of Pediatrics and the Maternal Welfare Committee to meet on a common ground. Certainly mental hygiene and vocational guidance and all that sort of thing have to be a part of the work of the pediatrician and not the maternal welfare committees. That is in our lap already but we could not do it all so we may have to split up this adolescent problem in its two phases.

Might I ask that the motion include that the Executive Board also create a working relationship between the American Academy of Pediatrics and the Maternal Welfare Committee so all questions where we are more or less on common ground shall be a continuing problem for that committee.

CHAIRMAN GRULEE.—I think that part of the motion would be out of order since we have a committee for cooperation with medical groups and that part of the motion could be referred immediately to that committee.

DR. NICHOLS.—May I ask how much ground work has been done on that particular point?

CHAIRMAN GRULEE.—Practically none. I think it is a very vital point and I am very glad to give the Committee on Cooperation with Other Medical Groups something to do.

DR. MARTMER.—I might say our clinic has limited its age to twelve years in the Children's Hospital on account of the segregation of the sexes. It has been my observation that this age, especially in the girls, is a very neglected age, because aside from the Children's Hospital there is practically no suitable place for the clinic patients to go within that age group and the social workers have told me they have been taking that age group to adult clinics and the attention they get is not what it should be. These are really children. They may be large and I

think all of us are sometimes inclined to overestimate their psychologic age or emotional age. I think they fit better into our clinics than into the adult clinics.

DR. SCHROEDER.—I think, Mr. Chairman, our approach to this problem, which, in my opinion, is one of the most important that could possibly come before us should be one of disavowing any tendency to thinking from the viewpoint that we are trying to increase the volume of pediatric practice. The adolescent is worth studying. Those of you who have tried to find any literature on adolescence must be astounded at the paucity of it. Over twenty years ago Stanley Hall published two volumes on it which are still worthy of anybody's study, but nothing approaching that study is of recent date. It seems to me this motion should be passed and is worthy of a good deal of thought.

I believe some approach is necessary if we are going to make any contribution to the field of adolescence. As I see it, what we have to do is to plan very definitely some course of action which will lead to the closer study of these boys and girls just past twelve and who, of course, cannot be taken into children's hospitals as a rule not only from the point of view of which Dr. Grulee spoke, on account of their growth and development, but because of the fact that most of us do not have beds to handle boys and girls of that size, but none of these drawbacks are definite deterrents.

We certainly have to begin to get studies on adolescence into our own literature. I am quite sure we will also get a great deal of support from the public because of the tremendous increase in juvenile delinquency. I am sure that the pediatricians of this country can contribute a great deal along that line. If the preschool period was the neglected age group surely the adolescent period is entitled to that dubious distinction now because it can truthfully be said that all of us have carelessly or even heedlessly disregarded it thus far.

I am very much in favor of this and hope in the next few years we will see increasing papers on the problems, presented by pediatricians.

CHAIRMAN GRULEE.—I think the approach is as Dr. Schroeder indicated. It should be a scientific approach first. It should be an approach with the idea of a study of the groups and then when we as a group have definite ideas that are worth-while, we should be the people to follow these things through. Some of the patients I have do come to me until they are sixteen or seventeen and I think every pediatrician has the same experience. I do not feel I am overstepping the bounds of pediatrics when I look after these girls and boys, but I believe we should not be grasping to increase the age of our groups and I do not think you mean that, just the opposite. We should develop it from the standpoint of the development of the scientific side and the development of study first, and it will automatically fall into the lap of the pediatrician to take care of those cases. But those things are not a question of a year or two.

DR. BLATT.—There is another movement in regard to the handling of adolescents in hospitals. The Passavant Hospital in Chicago is building some new wards for adolescents. I do not know who is to have charge of those wards.

DR. SCHROEDER.—I call for the question on the motion.

CHAIRMAN GRULEE.—The motion is that we have a special committee to designate the age limit of pediatric patients.

DR. ASHMUN.—That would include not only adolescence but any other problem.

The motion was put by the chairman and carried.

Motion to adjourn was made, seconded, and carried and the meeting adjourned at 10 P.M.

Academy News

The fall meeting of the Michigan members of the American Academy of Pediatrics was held Sept. 28, 1937, at Grand Rapids, Mich.

A dinner honoring Dr. A. Graeme Mitchell, regional chairman, preceded the business session. A report of the postgraduate activities was presented by J. A. Johnston, chairman of the committee on postgraduate instruction. At the three-day course held at Detroit April 19, 20, and 21, 1937, there were 43 registered, 10 of whom came from other states. They were as follows: Ohio, 3; New York, 3; Massachusetts, 1; Maryland, 2; and Canada, 1.

In cooperation with the State Department of Health under the Social Security Act a four-week refresher course was given at five centers in the northern part of the state. W. C. C. Cole, J. A. Johnston, and John Sanders acted for the Academy in conducting this course. There were an average of 75 registrants for this course.

E. W. May reported on the state nursing law and his contacts with the State Nursing Board.

Allan Richardson introduced the question of requesting the executive committee of the Academy to appoint a committee to review the present status of the thymus gland and present its findings to the Academy. This request will be transmitted to the regional chairman to be sent to the executive committee.

Lillian Smith, Director of the Maternal and Child Welfare Division of the State Department of Health, reported on the progress which has been made possible under the provisions of the Social Security Act.

B. W. Carey introduced Dr. Barrett of the State Department of Health who spoke on the subject of diarrhea in Michigan. He discussed the increase in deaths which has occurred during the past two years. At his request, a committee headed by B. W. Carey was appointed to cooperate with the State Department of Health to study the diarrhea situation.

Following an explanation of the Sex Education Law by Don W. Gudakunst, Deputy Commissioner of Health for the City of Detroit, a committee composed of Richardson, chairman, and Wishropp and Grob was appointed to cooperate with the various state agencies in connection with the Sex Education Law passed at the last meeting of the State Legislature.

The committee on postgraduate instruction composed of J. A. Johnston, chairman, and Levy, Cooley, Carey, and Martmer was reappointed for one year.

F. B. Miner reported on the committee composed of Miner, Foster, and Kempton which was appointed to act in an advisory capacity with the State Department of Health.

The membership report revealed 48 members in good standing—1 removed to Section I and 14 men in Michigan who were licentiates of the Board of Pediatrics but not members of the Academy.

Dr. E. G. Padfield of Salina, Kansas, has accepted the state chairmanship for that state.

News and Notes

The regular scientific meeting of the Georgia Pediatric Society will be held in Atlanta on Thursday, December 9. Guest speakers will include Dr. Ralph S. Muckenfuss, Director, Department of Health, Bureau of Laboratories, New York City; Dr. Priscilla White, attending physician, Deaconess Hospital, Boston, Mass.; and Dr. Joseph Brennemann, Professor of Pediatrics, University of Chicago, and Chief of Staff, Children's Memorial Hospital, Chicago.

Book Reviews

The Diseases of Infants and Children. By J. P. Crozer Griffith and A. Graeme Mitchell, ed. 2, Philadelphia, 1937, W. B. Saunders Company, 1,153 pages, price $10.00.

Griffith and Mitchell's Pediatrics has justly become one of the accepted American texts on pediatrics. This second edition, four years after the first of the one-volume text, is more than the usual multiple edition of a text. It has been entirely reset as well as revised, and is much improved in arrangement. The bibliographical references have been placed at the end of the chapters and, more important, refer to recent literature. A number of chapters have been entirely rewritten, including among others those on tuberculosis, diabetes, and acid-base balance. Throughout the book many minor changes are noted. The authors have succeeded in making the "Second Edition" a new text in keeping with present-day thought and the recent advances in pediatrics.

Feeding Behavior of Infants. Arnold Gesell, M.D., and Frances Ilg, M.D., J. B. Lippincott Company, $4.50.

In writing this monograph of 176 pages, the authors have performed a task which may mark the beginning of an almost revolutionary movement in pediatrics. They place the emphasis in their work on the ability and behavior of the baby in his feeding regime, rather than upon the doctor, nurse, or parents. This attitude toward child care is fundamentally sound. Until we understand thoroughly what babies can do, and why they act as they do, all talk of mental hygiene in infancy will be ephemeral.

Gesell and Ilg have stuck closely to their thesis that feeding of infants must at all times recognize their innate ability. They have given us an interesting picture of the development of feeding capabilities and their suggestions as to treatment are therefore based on the firmest sort of experimental foundation. The book is beautifully illustrated in a purposeful way.

My enthusiasm for their contribution is not at all dimmed by slight disagreement and reservation about some of their conclusions. They feel that reduction of diet is not a good stimulant to appetite, with which point of view I would take issue. More regard for the hunger-pain mechanism in developing appetite in babies might have been registered. One of two quotations will illustrate their attitude toward children better than all I can say. . . . "The old theory that we must train the infant by sheer discipline to do the 'right' thing is not tenable. The growing child is constantly shedding habits."

Then, "The success of child care does not depend so much upon skillful rule of thumb technique as upon the underlying attitudes of parents and attendants. Here lies the most promising field for medical guidance. . . . In almost a literal sense, the physician can reach the mind of the infant by altering undesirable attitudes in the parents. Through his authority and tactful suggestions he can moderate emotional tensions and reduce overanxiety. When occasion requires he can even do something to liberalize the parents' philosophic outlook. . . . All of this can be done on medical grounds, because of its direct bearing on the hygiene of the infant's feeding and of related behavior. The physician does not step out of his rôle when he consciously addresses himself to the adult-infant relationship as a dynamic reality which yields to advisory control." In the reviewer's opinion this expresses the essence of the pediatrist's most valuable relation to mental hygiene.

This book should be read by everyone who supervises infant feeding as it explains the baby's capabilities in detail and without his help our attempts to feed him are of much less value.

C. A. A.